ENVIRONMENT AND NATURAL RESOURCES COMMITTEE

INQUIRY INTO THE UTILISATION OF VICTORIAN NATIVE FLORA AND FAUNA

REPORT

June 2000

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The Committee records its appreciation to all those who have contributed to the Inquiry and the preparation of this report. A large number of individuals and organisations made their expertise and experience available through the submission process, the Committee’s inspection program and the public hearing process; they are listed in the Appendices. Specialist consultancies were undertaken by Mr Quentin Farmar-Bowers of Star Eight Consulting, Dr Graham Steed of G.R. Steed and Associates Pty Ltd and Mrs Tannetje Bryant and Mr Keith Akers of the Faculty of Law, Monash University. Technical review and advice was provided by Dr Robert Begg and Mr Spencer Field of the Department of Natural Resources and Environment and their associates. Additional technical advice was provided by Mr Tony Charters, Director of Planning and Destination Development, Tourism Queensland, Dr Graham Hall and associates of the Tasmanian Department of Parks and Wildlife, Professor Hundle of the National Ecotourism Accreditation Program, and Dr Ray Wills, Senior Ecologist at Kings Park and Botanic Gardens, Western Australia. The cover photograph is of Grampians Thryptomene (Thryptomene calycina) taken by Dr David Beardsell. Cover design by Luke Flood of Actual Size, with printing by Acuprint. Editing services were provided by Ms Heather Kelly. The report was drafted by the staff of the Environment and Natural Resources Committee: Ms Julie Currey, Dr Andrea Lindsay, and Mr Brad Miles. Administrative support was provided by Miss Kate Brown and Ms Kathy Karlevski. The research program was under the direction of Mr Brad Miles, Executive Officer of the Environment and Natural Resources Committee.
INQUIRY TERMS OF REFERENCE

Parliamentary Committees Act 1968

REFERRAL OF MATTER TO THE ENVIRONMENT AND NATURAL RESOURCES COMMITTEE

The Governor in Council under Section 4F of the Parliamentary Committees Act 1969 refers to the Environment and Natural Resources Committee for inquiry, consideration and report to the Parliament, the following matter relating to the utilisation of Victorian native wildlife and flora which, due to recently completed or ongoing Government inquiries, does not include marine fish and mammal species, game species as defined in the Wildlife Act 1975, pest species and native trees harvested for timber.

The Committee is required to report within the framework of ecologically sustainable use and particularly:
(a) identify the potential for utilisation of Victorian flora and fauna;
(b) assess the economic and environmental sustainability of that potential for different taxa of flora and fauna; and
(c) examine and report on the existing statutory and other controls on the utilisation of native wildlife and flora in Victoria and recommend on necessary changes in light of the findings on (a) and (b) above and any outcomes of the Senate Inquiry into the Commonwealth Utilisation of Australian Native Wildlife.

The referral was accepted by the Committee on 10 August 1998, but lapsed on the dissolution of the Legislative Assembly and prorogation of the Legislative Council on 24 August 1999. The Terms of Reference were reissued to the Committee on 23 May 2000.
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The greater majority of the Inquiry into the Utilisation of Native Victorian Flora and Fauna was undertaken by the Environment and Natural Resources Committee of the 53rd Parliament. This Committee conducted hearings, considered submissions, commissioned research projects and undertook inspections across Victoria as well as interstate and overseas. Prior to the calling of the election and consequent lapsing of the Inquiry it had substantially completed its report.

The new Environment and Natural Resources Committee has reviewed the work of the previous Committee and has, with a limited number of amendments, endorsed it.

In adopting the following inquiry report, the Environment and Natural Resources Committee of the 54th Parliament acknowledges the comprehensive work of its predecessor.

George Seitz, MP
Chairman
CHAPTER 1
INTRODUCTION

- BACKGROUND TO THE INQUIRY
- SCOPE OF THE INQUIRY
- TERMS AND CONCEPTS
- THE INQUIRY PROCESS
- ISSUES ARISING FROM THE CONSULTATION PROGRAM

The Report
This Report of the Parliament of Victoria’s Environment and Natural Resources Committee Inquiry into the Utilisation of Native Victorian Flora and Fauna is tabled in the Parliament pursuant to Section 40(1) of the Parliamentary Committees Act 1968.

BACKGROUND TO THE INQUIRY

Victorian legislation has typically led the nation in animal welfare and wildlife protection issues. Notably the establishment of the Animal Welfare Advisory Committee in 1980 was the forerunner of all such committees in Australia and the Prevention of Cruelty to Animals Act 1986 was one of the first modern animal welfare statutes in Australia. The Flora and Fauna Guarantee Act 1988 was one of the first pieces of legislation that addressed the conservation of native flora and fauna through the management of threatening processes.

As a consequence of the State’s current legislation and regulatory controls, with three notable exceptions, few species of native flora and fauna are taken from the wild in Victoria.

The three main exceptions to these restrictions on utilisation are the taking of defined game species (for example certain species of native duck), the harvesting of fish and the utilisation of native forests for timber. Legislative provision for these three forms of utilisation is long-standing.

Notwithstanding restrictions in Victoria on taking native species from the wild, cull or removal of defined species of native fauna is permitted if a local population is deemed to be having an adverse impact on agricultural activity or the special values of public land. One such instance, the culling of kangaroos in the Hattah-Kulkyne National Park, proved highly controversial.1 There was a public outcry with calls for such culling to cease. Others, while supporting the culling, were dismayed at the perceived
waste and advocated that use be made of the carcasses for meat or skins as is permitted in other States.\textsuperscript{2}

There have been other instances where the use of animals that are being killed as part of culling programs has been advocated. For instance, suggestions for making use of corellas, cockatoos and galahs being killed as part of required culling programs were investigated by the Committee during 1994-1995.\textsuperscript{3}

In June 1998, the Parliament of the Commonwealth of Australia’s Senate Rural and Regional Affairs and Transport References Committee tabled and published its report, Commercial Utilisation of Australian Native Wildlife.\textsuperscript{4} The Inquiry considered an array of philosophical, environmental and economic issues associated with the use of wildlife, as well as reviewing existing wildlife industries across Australia. ‘Wildlife’ was taken by this Committee to include native plants as well as animals, although the emphasis was on native animals.

The Senate Committee proposed a series of generally applicable principles and made 12 recommendations, four of which specifically referred to the States. These are included as Appendix II of this Report. Their effect is that, subject to meeting prescribed conditions and processes, commercial utilisation of any species is supported.\textsuperscript{5}

This Committee’s Terms of Reference, unlike those of the Senate Inquiry, are not restricted to commercial forms of utilisation and require the Committee to report within a framework of ecologically sustainable use.

**SCOPE OF THE INQUIRY**

The Environment and Natural Resources Committee has carried out the Inquiry under Terms of Reference referred by the Governor-in-Council by Order dated 30 September 1997 under Section 4F of the Parliamentary Committees Act 1968.\textsuperscript{6} Given other commitments of the Committee, the Inquiry did not commence until August 1998. The full Terms of Reference are reproduced on page iv. The Inquiry lapsed on 24 August 1999 as a consequence of the dissolution of the Legislative Assembly in order to hold a general election, but the Terms of Reference were reissued by Order in Council of 23 May 2000.

The Environment and Natural Resources Committee is a joint investigatory committee of the Victorian Parliament with statutory power to conduct inquiries into matters concerned with the environment, natural resources and land-use planning.\textsuperscript{7} The Committee’s membership is drawn from both Houses of the Victorian Parliament and includes all political parties represented in this Parliament.
The Committee has examined the outcomes of the Senate Inquiry into the Commercial Utilisation of Australian Native Wildlife and considered their applicability to the Victorian context. It has reviewed an array of existing and potential forms of utilisation of native flora and fauna and examined the legislative and regulatory framework associated with such utilisation. The Committee has consulted widely and inspected a range of relevant businesses and organisations involved in utilisation and associated research in Victoria, interstate and overseas.

A key issue before the Committee was whether the current restrictions on taking native flora and fauna from the wild should be changed to allow for commercial utilisation.

The Committee reports on its identification of potential utilisation and its assessment of the economic and environmental sustainability of that potential, and makes recommendations for change to existing controls. It has reported, as required by the Terms of Reference, “within the framework of ecologically sustainable use”.

In line with the Terms of Reference, the Committee has not reported on the utilisation of a number of floral and faunal groups, “due to recently completed or ongoing government inquiries”. These exclusions are:

- marine fish;
- marine mammals;
- existing game species;
- pest species;
- native trees harvested for timber.

**TERMS AND CONCEPTS**

A clear understanding of what is encompassed by the terms ‘native flora and fauna’, ‘utilisation’ and ‘statutory and other controls’ is central to the Inquiry. Ecological and economic concepts, notably ‘ecologically sustainable development’ and economic viability, are key elements of the Terms of Reference. Additional terms are included in the glossary included as Appendix I.

**Native Flora and Fauna**

In the Australian context, ‘native flora and fauna’ are generally considered to be those plants and animals established in Australia prior to 1788. The term ‘indigenous’ is generally more narrowly defined: “originating in and characterising a particular region or country”. For the purposes of the current Inquiry, the term ‘Victorian native flora and fauna’ has been used to encompass native flora and fauna indigenous to Victoria, as well as native species introduced or brought into the State from elsewhere in Australia. Flora and fauna introduced into Victoria from overseas are excluded.
The Committee has taken the view that the term ‘native flora and fauna’ encompasses such species wherever they may occur, whether in the wild or elsewhere.

**Utilisation**

The Committee has defined ‘utilisation’ as being: to use, make use of, to gain benefit from such use. Utilisation may be commercial, that is involve commerce or profit making, or be non-commercial.

Commercial utilisation includes the collection, harvesting, processing and preparation for sale of native flora and fauna and of products derived from these. Non-commercial utilisation covers any other form of use from which human benefit may be gained.

Utilisation activities may also be grouped into two main types:

a) consumptive forms of utilisation - uses which permanently remove either the organisms or their products from the population or ecosystem concerned;

b) non-consumptive uses - uses by which humans derive benefit without permanently removing organisms or their products from the population or ecosystem concerned.

By way of example, looking at a wildflower or native animal in its natural habitat as part of an ecotourism tour would be a non-consumptive use. Breeding second-generation captive stock of birds for sale or enjoyment would also be non-consumptive uses. If the utilisation involved the removal of the plant or animal from its natural habitat, say to harvest it for sale or processing or to obtain breeding stock, then it would be a consumptive use.

Consumptive forms of utilisation may affect:

c) the population of the species - that is, involve the death of the entire organism or the removal or destruction of part of the organism (irrespective of whether the organism is part of the wild population or part of a captive/cultivated population) - for example harvesting a kangaroo from the wild or processing an emu grown on a farm; or

d) the natural ecosystem - that is, involve the relocation of the organism or part of the organism from the wild to elsewhere - for example to obtain breeding stock for an aviary or to stock a wildlife park.

**Statutory and Other Controls**

There is an array of controls available to regulators. The nature and role of the key controls used in Victoria (and indeed most of the Western world) are briefly described below.
Acts
Acts, also known as statutes or enactments, are a set of laws made by Parliament and given Royal assent. An Act is a primary legislative instrument - it may give authority for the making of another legislative instrument. The role of Acts is to constitute the process of formulating general rules or conduct without reference to particular cases and they usually operate in the future. Acts state the general principles of a scheme. Examples include the Flora and Fauna Guarantee Act 1988 and the Wildlife Act 1975.

Subordinate Legislation
Subordinate legislation is made under the authority of an empowering Act, but is made by authorised persons, such as a Minister of the Crown or the Governor-in-Council, not by Parliament. It is, however, subject to disallowance or scrutiny by Parliament. There are a number of different types:

a) regulations - these deal with matters of administrative or technical detail, particularly where this detail may need to be changed from time to time. An example is the Wildlife Regulations 1992;

b) by-laws and local laws - these are usually restricted in operation to a geographical area;

c) statutory rules - which are mainly used for formulating and setting administrative procedures for government departments and courts.

Administrative Quasi -Legislation
This form of legislation "refers to a range of instruments issued by administrative bodies which seem to be legislative in character, but which were not made formally in the exercise of legislative powers delegated by Parliament". There are a number of types of quasi-legislation, including policies, codes, practical notes, rulings, administrative guidelines and standards. Their status depends on how they are adopted. For instance, an Act may expressly state that regard must be had to a policy, or may provide that regard must be given to directions by a Minister.

Codes can provide detailed technical standards, which are developed in cooperation with the experts from a management or industry body. They also provide for self-regulation. They are more flexible than regulations because codes of practice can be changed without the need to comply with procedural requirements that apply to regulations. Such 'codes of practice' may be:

a) non-binding - such as an advisory code or voluntary code agreed to by an industry and/or by government), for example the Code of Conduct for Australian Aquaculture; or

b) binding - one which has been given particular meaning and application under an Act or regulation; that is where the Act expressly authorised the code to be made. An example is the Code of Practice for Emu Farming created under the auspices of the Prevention of Cruelty to Animals Act 1986.
Ecologically Sustainable Development

The concept of ‘Ecologically Sustainable Development’ (ESD) has developed over the last few decades, with major advances via the ‘Brundtland Report’ (1987) and ‘Agenda 21’ and the ‘Rio Declaration’ (1992). It is a concept that offers an integration of economic and environmental perspectives in decision-making.

The Brundtland Report, the report of the United Nations’ World Commission on Environment and Development, made it clear that the world’s pattern of economic growth was not sustainable in ecological terms and that a new approach to development was required. It advocated sustainable development, which it defined as “development that meets the needs of the present without compromising the ability of future generations to meet their own needs”. This definition is now well established and continues to be used by the various United Nations’ agencies and in the programs of many of its Member countries.

The Agenda 21 agreement and the associated Rio Declaration were adopted by the United Nations’ Conference on Environment and Development’s ‘Earth Summit’ of 1992. The agreement was driven by the recognition of the “indivisibility of environmental protection and the development process”. Emphasis was placed on the development of a comprehensive program that was practical and acknowledged the legitimate desires of all humans:

- Human beings are at the centre of concerns for sustainable development.
- They are entitled to a healthy and productive life in harmony with nature.

ESD ideas are continuing to be developed and interpreted internationally, notably through the work of the United Nations’ Commission on Sustainable Development.

Within Australia the term ‘ecologically sustainable development’ is more generally used. The use of the prefix ‘ecologically’ gives overt emphasis to the environmental basis of sustainability. The term has been adopted in the National Strategy for Ecologically Sustainable Development (National ESD Strategy) and is now in general use throughout Australia.

The National ESD Strategy provides a simple interpretation of the term ESD:

- ESD is development which aims to meet the needs of Australians today, while conserving our ecosystems for the benefit of future generations.

The National ESD Strategy, which was agreed to by all Australian governments in December 1992, was initiated in 1990 to identify an approach to embrace the ESD concept in a meaningful manner for Australians. Consistent with the international approach, the ESD concept as adopted in the Australian context involves economic, environmental and social elements.
The anticipated benefits of an ESD approach are high. The Council of Australian Governments considered that “by following an ESD path of development, we should be able to reduce the likelihood of serious environmental impacts arising from our economic activity”.

ESD is not synonymous with ‘ecologically sustainable’. ‘Ecologically sustainable’ means only that the ecosystem is sustained. For an ‘ecologically sustainable’ use, for example the use of native flora and fauna, to become an ‘ecologically sustainable development’ it must provide for intra- and inter-generational equity and also enhance individual and community welfare and wellbeing. In practice the difference between the two terms may be substantial.

**Economic Viability, Markets and Competition Policy**

For any industry to be economically viable it should be profitable in the longer term. Some industries may be very profitable in the short term but, to do so, may be unviable in the longer term. An economically viable industry is also not necessarily economically viable for any particular participant in that industry.

The national Standing Committee for Agriculture and Resource Management has developed a set of indicators to test industry viability. These indicators include natural resources and social and environmental factors as well as economic ones. In other words, industry viability is not based on economics alone.

Commercial activity requires a market. A market is where a buyer and seller agree to trade. For a trade to occur both buyer and seller must be satisfied with the price, form and quality of the product. In theory, open, competitive markets should ensure that resources are allocated to the production of goods and services that consumers most highly value, that firms supply desired goods and services at least cost, and that technological innovation is promoted (by producers who compete for business by developing new and improved products and processes).

Markets may, however, fail to achieve outcomes desired by the community, most commonly because of the presence of externalities, public goods and natural monopolies. Externalities arise where private decision-makers impose costs or benefits on others in the community who are not compensated. An example of a positive externality might be the actions of a landholder that bring benefits to adjoining landholders for which they do not pay. Air pollution, on the other hand, is often cited as a negative externality. Public goods are those goods or services that do not diminish as more people use them and where it is impossible or impracticable to exclude non-payers from using the resource. Natural monopolies occur in situations where it is cheapest for a single firm to supply the entire market demand. Competition will not lead to efficient outcomes in these circumstances.
The presence of market failure may lead a government to intervene in the economy by, for instance, introducing legislation. Such intervention has been widely used to conserve natural resources (such as native plants and animals) and manage their utilisation, because they are public goods and subject to a range of externalities.

In recent years there has been concern that governmental intervention is excessive and has created unnecessary monopolies and restrictions. In response to this view, the national and State governments have developed and endorsed a National Competition Policy. A guiding legislative principle of the Policy’s approach is that “legislation should not restrict competition unless it can be demonstrated that the benefits of the restriction to the community as a whole outweigh the costs and that the objectives of the legislation can only be achieved by restricting competition”.

THE INQUIRY PROCESS

The Committee has approached the Inquiry in a structured manner. The key elements of its approach were:

a) a discussion paper;
b) written submissions;
c) inspections;
d) research investigations; and
e) public hearings.

In accordance with the Parliamentary Committees Act 1968, a copy of any written submission, investigation or record of public hearing evidence is available on request to any member of the public (other than in special circumstances).

Discussion Paper

The Committee prepared a Discussion Paper: Utilisation of Native Flora and Fauna Discussion Paper, with the objective of providing a focus for those wishing to make submission to the Inquiry. The Discussion Paper was published in November 1998 and made generally available through the Victorian Government’s bookshop, Information Victoria. The text was also placed on the Committee’s Internet Website. The Inquiry Terms of Reference and a call for submissions were included in the Discussion Paper.

The Discussion Paper provided an introductory overview of:

a) the Senate Inquiry;
b) the main types of utilisation;
c) the nature of Victoria’s native flora and fauna;
d) concepts of ‘Environmentally Sustainable Development’, economic viability, welfare, and ownership;
e) current utilisation activity in Victoria; and
f) regulatory controls in Victoria and elsewhere.
It concluded with a section on potential future directions.

An initial distribution of some 350 copies was made to those on the Committee’s wide-ranging mailing list. The remainder of the 1500 copies printed were distributed in response to inquiries from interested people and organisations.

A media release was prepared and distributed to over 200 organisations, including metropolitan and regional newspapers and radio. Advertisements were inserted in the major capital city and regional dailies as well as selected local papers and the two major statewide-circulating country newspapers. The Chairman conducted a number of radio interviews. Follow-up advertisements were placed in the Age and the Weekly Times prior to the close of the submission period.

Written Submissions

A three-month submission period followed the publication of the Discussion Paper (closing on 26 February 1999). As at 9 June 1999, 74 written submissions had been received by the Committee. The submissions came from a relatively wide spectrum of viewpoints, with interested individuals as well as peak-body organisations and agencies contributing submissions. Submissions from individuals came from country Victoria as well as Melbourne. Many of the submissions were well researched and presented and over 25 per cent provided detailed attachments. All contained information and views of relevance to the Inquiry, and the Committee appreciates the time and effort taken by these individuals and organisations.

Table 1.1 Submissions

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</tr>
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A full listing of submissions is included as Appendix IV. Copies of submissions are available on request.

Inspections

The Committee considered it important to see various utilisation sectors first hand. To this end it undertook an inspection program focussing on representative operations. It also made a point of inspecting especially innovative programs, both in Australia and overseas.

The Committee visited:

a) Amsterdam - home to the world’s largest wholesale flower markets;

b) Israel - whose highly competitive and technologically driven industry currently exports more Australian wildflowers than does Australia;

c) Zimbabwe - which has developed a successful and innovative program involving local communities in wildlife management by way of transfer of ownership and management responsibilities; and

d) South Australia - particularly its nature-based tourism, bushfood and kangaroo industries, its plant industry research and aquaculture activity.

The Committee also visited a number of locations throughout Victoria - the Grampians, Phillip Island and South Gippsland, Melbourne and the Dandenongs, and Inglewood. These inspections covered broad-acre flower farms, aquaculture, Aboriginal utilisation, ecotourism, bushfood production and processing, aviculture, kangaroo-meat processing, the pharmaceutical sector, wholesale and retail wildflower nurseries and eucalyptus-oil processing.

A full outline of the Committee’s inspection program is included as Appendix V.

While it was not possible for the Committee to visit examples of all sectors, the inspection program enabled members to gain an appreciation of the on-ground nature of utilisation. The Committee is most appreciative of all those who so readily gave their time and knowledge to assist with the inspection program.

Research Investigations

The Committee engaged consultants to assist it with three key areas of the Inquiry. These were Ecologically Sustainable Development, Economic Viability, and Regulatory Controls. The results of these three small consultancies have been directly translated into the Discussion Paper and this Inquiry Report. The full research reports are available on request.

In addition, the Committee staff, on behalf of the Committee, collected a substantial amount of information from secondary sources. These sources included published
references, Internet sites, and direct contact with relevant researchers and key personnel in agencies, organisations and businesses.

**Public Hearings**

A targeted series of Public Hearings was held in April and May 1999. In response to an initial review of the written submissions, the Committee invited representatives of a number of sectors to provide clarification and/or additional information. In all, 25 persons from 12 different organisations gave evidence. A full list of those who gave evidence, and their affiliation, is included as Appendix VI. All hearings were open to the public and advertised in *The Age*. The Hansard transcripts of the hearings are available on request.

**ISSUES ARISING FROM THE CONSULTATION PROGRAM**

Virtually all sectors of utilisation were raised, to at least some extent, in the written submissions and the public hearings.

Biodiversity and kangaroo management were the issues most often raised in submissions. A few submissions attempted to respond to all of the questions posed in the Discussion Paper, but most provided views and information restricted to a particular area of interest or to the sector in which they were involved.

A number of submissions indicated a sense of frustration with current regulations and their administration; others considered that the controls needed to be more restrictive.

Strongly held and diametrically opposed views were presented about the killing of native fauna as part of utilisation programs. Some considered the killing of any wild animal to be unacceptable. Others advocated making use of animals being killed as part of culling programs to avoid ‘waste’ of the resource.

The point was made by some that other States had long permitted forms of utilisation that were not permitted in this State, such as the commercial harvesting of kangaroos and the wild harvest of wildflowers. They advocated that Victoria follow these examples. A view was also presented that some newly developing sectors, such as bushfoods and privately run ecotourism ventures and conservation parks, were areas that Victoria should support.

Virtually all submissions making comment on particular forms of utilisation stressed the need for a precautionary approach to be taken in response to potential environmental impacts and/or for activity to be undertaken in an ‘ESD’ manner.

While many submissions supported the need for utilisation to be environmentally or ecologically sustainable, comparatively few made detailed comment on the Committee’s proposed ESD framework. A proportion did, however, use the
Committee’s sector-based questions (which had been framed from an ESD perspective) to argue the case of their sector’s sustainability.

There were comparatively few submissions that addressed the issue of economic viability in detail or from a cost-benefit perspective.

While about 25 per cent of submissions made reference to existing regulatory controls, few made detailed suggestions concerning methods to overcome perceived shortcomings.

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1 Hattah-Kulkyne National Park is in the dry north-west of the State. It is comparatively small and surrounded by agricultural lands. Large sections had in the past been subject to grazing by cattle and a major management objective is the restoration of ground flora. It has permanent water and movement of its marsupial fauna is restricted to a series of management blocks by fencing. Their population numbers had increased through natural breeding to such an extent that revegetation programs were at risk. This led to the decision to reduce their numbers by way of a cull.

2 For example, M. Delahunty, Professional hunter, Minutes of Evidence, 3 May 1999.


4 Senate Rural Affairs and Regional Affairs and Transport Reference Committee (1998), Commercial Utilisation of Australian Native Wildlife, Report of the Senate Rural and Regional Affairs and Transport References Committee, Canberra.

5 The only form of utilisation specifically excluded in the Senate Committee’s Report is the harvesting of adult birds from the wild for the avicultural industry, and even in this instance it provides for limited harvesting if certain conditions can be met.


7 Parliamentary Committee Act 1968, s. 4EA.

8 The relevant strategies and inquiries were not, however, defined.

9 The Committee has chosen to take this to include species of estuarine fish.

10 As defined by the Wildlife Act 1975.

11 Being ‘noxious weeds’ and ‘pest animals’ defined under the Catchment and Land Protection Act 1994.

12 Macquarie University NSW (1990), The Macquarie Dictionary, p. 888.


14 ibid, p. 11.

15 For example local laws made by municipal councils under the Local Government Act 1989.


17 The Act that authorises the making of a code may impose criminal penalties for breach of the Code.


25 The role of the Commission is threefold: to review progress on implementing the three main outputs of the United Nations Conference on Environment and Development: the Rio Declaration, Agenda 21 (which is, in effect, the associated action plan), and the ‘Forest Principles; to undertake further work on policy and activities; and to promote dialogue and build partnerships. (Internet site: http://www.un.org/esa/sustdev/csdback.htm - 15/06/1999). It meets
annually for a period of two to three weeks, most recently in New York in April 1999 - its seventh session (see http://www.un.org/esa/sustdev/csd7prog.htm for additional program details of this session).


27 ibid.

28 ibid, p. 7.

29 As is discussed further in Chapter 2.


32 Independent Committee of Inquiry, *National Competition Policy*, (the ‘Hilmer Report’). It was signed by the Council of Australian Governments in April 1995.

33 ibid.

34 Section 4R of the *Parliamentary Committees Act 1968* states that material shall be made available “unless in the opinion of the Committee special circumstances make it undesirable to do so”. Such special circumstances could, for example, include evidence given in private (see s. 4J (3)) or confidential submissions.


36 Late submissions were accepted and, to the extent possible, taken into account.
CHAPTER 2
AN ESD FRAMEWORK

• INTRODUCTION
• THE NATIONAL CONTEXT
• RECOMMENDED FRAMEWORK

INTRODUCTION

The concept of Ecologically Sustainable Development (ESD) has been adopted by all governments in Australia, as well as internationally. It is considered a useful concept to pursue development that is sustainable in the longer term. In this chapter the Committee outlines the National ESD Strategy, which provides a context for considering ESD within Victoria, and illustrates its application to wildlife management situations by way of three described scenarios.

As is required under the Inquiry Terms of Reference, the Committee has developed an ESD Framework. This has provided the Committee with a reference point in its consideration of existing and potential utilisation activity and legislation. Its three constituent parts - Objectives, a Question Set and a Management System - are briefly described.

THE NATIONAL CONTEXT

Australia has the benefit of a ‘National Strategy for Ecologically Sustainable Development’ (National ESD Strategy).1 This was developed through a wide-ranging and lengthy consultation process. It puts forward the idea that the outcomes of development will be better for all Australians in the long term if decision-makers consider, in an integrated way, social, economic and environmental issues at the time of taking development decisions. It interprets ESD in a practical manner by setting a goal, three core objectives and seven guiding principles.

The goal of the National ESD Strategy is:

Development that improves the total quality of life, both now and in the future, in a way that maintains the ecological processes on which life depends.2

The core objectives are:

a) to enhance individual and community well-being and welfare by following a path of economic development that safeguards the welfare of future generations;
b) to provide for equity within and between generations; and
c) to protect biological diversity and maintain essential ecological processes and life-support systems.\(^3\)

Another fundamental element of the National ESD Strategy is a series of ‘guiding principles’. These are:

a) decision-making processes should effectively integrate both long- and short-term economic, environmental, social and equity considerations;

b) where there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation;

c) the global dimension of environmental impacts of actions and policies should be recognised and considered;

d) the need to develop a strong, growing and diversified economy which can enhance the capacity for environmental protection should be recognised;

e) the need to maintain and enhance international competitiveness in an environmentally sound manner should be recognised;

f) cost-effective and flexible policy instruments should be adopted, such as improved valuation, pricing and incentive mechanisms; and

g) decisions and actions should provide for broad community involvement on issues which affect them.\(^4\)

The Strategy envisages that these core objectives and guiding principles are part of a package; “no objective or principle should predominate over the others”.\(^5\)

The Strategy goes on to set out an approach to ESD that involves the development of strategic directions, policy and action plans, integrated decision-making and community involvement.\(^6\) The Strategy, and consequently its approach to ESD, have been agreed to by all Australian governments.\(^7\)

The Council of Australian Governments also approved an Inter-governmental Agreement on the Environment in 1992. The Agreement commits all parties to the principles of ESD, to pursue “the effective integration of economic and environmental considerations in decision-making processes, in order to improve community well-being and to benefit future generations”.\(^8\)

Although adopted and agreed to in 1992, the National ESD Strategy continues to be the Commonwealth’s principal policy statement on ESD and is the basis of new Commonwealth environmental legislation - the Environment Protection and Biodiversity Conservation Act 1999.\(^9\)

**Applying the National ESD Strategy**

As described in the preceding chapter, ESD is defined in the National ESD Strategy as: “development which aims to meet the needs of Australians today, while conserving our ecosystems for the benefit of future generations”.\(^10\)
Applying such definitions to on-ground situations is difficult because they address extremely broad issues and they leave plenty of room for argument and debate.

The National ESD Strategy contains 76 specific objectives relating to the activities of particular industry sectors (for example agriculture), inter-sector issues (such as biodiversity) and conflict management, education and monitoring. For each objective a series of actions is defined. Implementation is envisaged to be by governments, business, community organisations and individuals, although the defined actions are restricted to government undertakings.

Implementation of the Strategy largely relies on existing analytical tools, such as impact assessment and benefit/cost analyses. Some areas of ESD are, however, difficult to handle using these existing tools - especially equity, long-term considerations and the full integration of objectives.

Moreover, the National ESD Strategy is not a definitive statement covering all needs for all time and all circumstances and it is not an instruction manual. Nor is it a panacea for the maintenance of biodiversity.

An indication of the difficulty in implementing ESD is provided by a recent Inquiry undertaken by the federal Productivity Commission: Implementation of Ecologically Sustainable Development by Commonwealth Departments and Agencies. The Commission assessed the level of application of ESD principles in policy formulation, through legislation and within programs by an array of federal government departments. Its assessment, as described in its draft report, concluded that implementation by departments and agencies varied widely and that it was uncommon for ESD objectives and principles to be taken fully into account from the initial policy development stages right through to the monitoring and review.

While the Productivity Commission found that the achievement of ESD was inherently complex, it also found that in some cases ESD implementation had been limited by a failure even to attempt existing good practice processes for policy design and implementation. Lack of long-term policy focus, shortage of required data (and a lack of commitment to obtain required data) and a lack of clarity concerning what constitutes an ESD-related policy were other factors identified as limiting the extent and quality of ESD implementation. Implementation was highest in agencies where natural resource management is a core business, and consequently ancillary to legislative responsibilities (where natural resource management is not a core business there was less progress).

The Productivity Commission made a series of draft recommendations aimed at overcoming the observed impediments to ESD implementation. They involve:

a) improving practices of policy making;
b) improving coordination between Commonwealth agencies, and between Commonwealth agencies and other stakeholders;
c) requiring regular monitoring and review of policy initiatives;
d) enhancing the focus on long-term planning; and
e) developing a longer-term commitment to monitoring the state of the environment (as currently occurs for economic and social trends).\textsuperscript{15}

One of the more specific proposals floated by the Productivity Commission to advance ESD implementation was the creation of a statutory ‘duty of care’ in relevant legislation.\textsuperscript{16}

**ESD and the Utilisation of Native Flora and Fauna**

The National ESD Strategy includes some specific statements on the utilisation of native plants and animals (the improvement of kangaroo management at the national level as an objective of the agriculture sector program\textsuperscript{17} and a series of statements on fisheries ecosystem management\textsuperscript{18}). Furthermore, its core objectives are central to issues arising from the utilisation of native Victorian plants and animals.

The National ESD Strategy is not, however, about the use of native flora and fauna per se. It does not, for example, provide advice as to what is the best way to protect habitat or whether a native species should or should not be exploited. No specific statements or guidance are provided about the wide array of existing sectors, let alone potential activity.

Perhaps the most useful role of the National ESD Strategy, in the context of utilising natural resources such as native flora and fauna, is to provide a means to assess any existing or proposed development. It envisages that development will be assessed in terms of the Strategy’s three core objectives and reflect the seven guiding principles.

The Committee has taken the view that uses of native flora and fauna that conform to ‘ecologically sustainable development’ will be able to demonstrate that their long-term outcome reflects the three core objectives of the National ESD Strategy. That is utilisation will:

a) enhance individual and community well-being and welfare;
b) provide for equity within and between generations; and
c) protect biological diversity and maintain essential ecological processes and life-support systems.\textsuperscript{19}

Taking heed of the advice of the National ESD Strategy itself, the Committee agrees that:

No objective or principle should predominate over the others. A balanced approach is required that takes account of all these objectives and principles ... [in the pursuit of] ... the goal of ESD.\textsuperscript{20}

and notes that a positive result for one or two objectives cannot compensate for a negative result for the remaining objective.
Three Illustrative Scenarios

Three fictional scenarios are given below to illustrate the relevance of an ESD approach to the utilisation of native flora and fauna.

The first scenario illustrates the importance of matching the nature and flow of values available from an ecosystem to the welfare requirements of the people gaining benefits. In the scenario, the mismatch leads to disaster, not only for the ecosystem, but also for the people who use the resource. The scenario also illustrates the importance of the precautionary principle.

Scenario One:

The fisheries managers are optimistic and so allow the fishers to undertake a rapid exploitation of a new fishery. After a few years the fishery is depleted (loss of consumptive value and also loss of recreational, option, bequest and existence values). The populations of marine mammals that use the ecosystem are in decline and the potential for eco-tourism is lowered. The fishers are now overcapitalised and many people have loans they cannot repay. The ongoing welfare requirements of individual people and the community have not matched the flow of income available from the fishery and its ecosystem. The lack of ecological research and lack of a local community ‘sinking fund’ means that there is little knowledge gain (no education or research value) and the financial problems require national subsidy. Although some fishers gained good incomes for a time, the potential flow of values from using the ecosystem, of which the fishery was one part, has been cut short by over utilisation. This utilisation of native fauna did not lead to a permanent enhancement of welfare for individuals, let alone the community, and so does not meet the first objective of the National Strategy.

The second scenario illustrates the importance of using a management system that can handle complex long-term objectives and shows how concentrating on specific management objectives can lead to inflexibility and a reduction in welfare for parts of the community.

Scenario Two:

A government agency improves the roads in a park to facilitate tourism. In addition to the public, some tour operators are now able to operate in the park. The new facilities and advertising establish a pattern of usage in the park that gradually becomes fixed and irrevocable (commercial, recreation and education values are met but bequest and existence values are reduced). Increasing use and expansion of facilities change many of the ecosystems in the park. The recreation and education values are reasonably spread throughout the community but the ecosystem changes are reducing the naturalness of the park so inter-generational equity is being compromised. The government agency increases the park admission fees as the sole ‘demand management measure’. The increased fees reduce the participation
rate of poorer people, thereby compromising intra-generational equity. Although the initial utilisation increases the value derived from the park (commercial, recreation and education values), first inter-generational equity declines and later intra-generational equity is reduced. As time advances there is less and less scope for changing the distribution of values derived from the park. The utilisation of flora and fauna does not meet the intra-generational equity objectives of the National ESD Strategy.

The third scenario shows how addressing the objectives of the National Strategy in the utilisation of native flora can lead to increased commercial value and also to general improvements in knowledge that benefit all people involved, including future generations.

**Scenario Three:**

The government allows registered users from the horticultural industry to collect seed and plant material from specific reserves, using a flexible annual permit system (commercial value). As part of the registration, users have to work within an approved management system. The fees and ongoing royalties are used collaboratively by the industry and government to bolster biodiversity protection. Within a few years the horticultural industry has mapped these reserves and increased the knowledge of their ecology. This information has led to a continual improvement in their management and so inter-generational equity is more assured. The industry has also funded the expansion of the reserves, an off-site research and education centre, and the education of more taxonomists (education and research values). This utilisation is moving towards achieving the welfare, equity and biodiversity objectives of the National ESD Strategy.

**RECOMMENDED FRAMEWORK**

The Committee considers that the ESD concept provides a logically consistent platform with wide appeal and relevance to the utilisation of native flora and fauna. While it establishes an ideal, it can nonetheless be applied to any particular form of utilisation.

The National ESD Strategy’s approach is, however, complex and some form of framework is needed. A simple, but consistent, framework was developed by the Committee to assist in the consideration of utilisation of native flora and fauna. It acknowledges that any form of utilisation is a progressive activity, rather than a static one. The framework was described in the Committee’s Discussion Paper and its development is outlined in Appendix VII. The recommended ‘ESD Framework’ is a direct interpretation of the ideas behind ESD.

Most forms of utilisation will reflect, to a greater or lesser extent, the concept. The key and challenge to implementing the ESD concept is to actively respond to its core
objectives - to seek ways of continually improving well-being, increasing equity and better maintaining biodiversity.

Some forms of utilisation activity may fail to meet ESD requirements - if it, for example, leads to a diminishing of well-being and equity and fails to maintain biodiversity. The Committee believes that such utilisation activity should be rejected. However, the Committee believes that mostly the application of ESD approaches to the development and consideration of a utilisation activity will not necessarily lead to the passing or failing of proposals, rather it will be used as a powerful tool to help improve the nature of proposals and thus the delivery of benefits to the proponent as well as the community.

The Committee considers that its recommended ESD Framework, as described below, when developed and operational will provide a means to ensure that decisions on the utilisation of Victorian native flora and fauna move towards the realisation of ESD.

The Committee's recommended ESD Framework has three parts:

a) a set of objectives;
b) a question set; and
c) a management system.

The framework also includes a number of feedback loops. In particular, a review of the utilisation objectives and/or the implementation programs is needed when outcomes vary from the initial objectives.

**Section A - Objectives**

The Committee has concluded that the ESD concept encompasses three core objectives:

a) improving individual and community welfare and well-being;
b) increasing inter- and intra-generational equity; and
c) maintaining biodiversity and ecological processes.

The driver for the Committee's recommended ESD Framework is the three core objectives of the National ESD Strategy, allied to the notion that none of these objectives has precedence over the others.

A commitment to the core ESD objectives is considered a vital and necessary precursor to the commencement of any management process professing to deal with any form of utilisation.

A practical interpretation of these core objectives from the context of the particular aspiration or needs of the user is required. People have their own reasons for doing things and it is likely that each stakeholder group will have different reasons and expectations for their particular form of utilisation activity. Moreover these reasons...
and expectations may change over time. Consequently, an interpretation of the core ESD objectives will be required.

The Discussion Paper noted a number of reasons for the use of native flora and fauna that may be desired by the community as a whole.24 These are:

- a) to provide an incentive to preserve a species and indirectly its habitat (by the deliberate placement of a financial value on a species);
- b) to offer opportunities to broaden the income base of struggling rural businesses;
- c) to explore the potential for utilisation as part of conservation programs of population control;
- d) to build on existing Victorian industry sectors; and
- e) to take advantage of the adaptation of endemic species to Australia’s landscape (instead of, or in combination with, introduced species).

These five ‘reasons’ offer examples of the more specific interpretation of the ESD utilisation objectives by a stakeholder group. For other stakeholders the reasons for utilisation may be more simple - such as to obtain a livelihood or create a return to shareholders. Such ‘reasons’ provide the context in which the ESD objectives need to be interpreted.

Improving Individual and Community Welfare and Well-being
In effect this core ESD objective is about the generation of economic wealth and benefit. However, the objective goes beyond a narrow financial view of wealth - the ‘benefit’ of a pristine waterway or access to a wild population of animals can, for instance, also contribute to the well-being of individuals. Community benefits could include clean air and good water quality.

Increasing Inter and Intra-generational Equity
Equity implies a sense of fairness. In an economic sense it could relate to the equitable sharing of economic benefit to the various sectors of society. Equity principles also extend across generations. A decision on utilisation of a plant or animal that enables inter-generational equity will ensure that future generations can enjoy the use of that plant or animal to the same extent as the current generation that is seeking utilisation now.

Maintaining Biodiversity and Ecological Processes
Biodiversity means “the natural diversity of all life: the sum of all our native species of flora and fauna, the genetic variation within them, their habitats, and the ecosystems of which they are an integral part”25. Biodiversity thus operates at genetic, species and ecosystem levels.26 An ‘ecosystem’ is a unit of plants and animals, together with their environment (that is the atmosphere, soil and water) which form an interacting system of activities and functions.27 Ecological processes are those that affect the matter and
energy flow between organisms and from and between the physical surrounds of the
organisms.

Maintaining biodiversity is consequently far more complex than merely ensuring that
no species is driven to total extinction.

The implementation of the Committee’s ESD framework thus requires a commitment
to the broad objectives and an interpretation of these objectives in the context of a
particular sector or activity. In summary:

| Part 1 Commitment | Commitment to achieve the ideas embodied in the three core objectives of
the National ESD Strategy:
(1) Improving individual and community welfare and well-being;
(2) Increasing inter- and intra-generational equity; and
(3) Maintaining biodiversity and ecological processes;
plus the notion that all three objectives need to be met. |
|-------------------|------------------------------------------------------------------------|
| Part 2 Interpretation | Clarification of the practical meaning and application of these core
objectives - in the context of desired utilisation objectives. Such
clarification to be subject to an iterative process of review. |

Section B - The Question Set

The Question Set is a technique to generate information on the existing and potential
forms of utilisation and may be helpful for the initial and review stages of the
suggested management process (see next section). The questions are set from an ESD
perspective.

The questions have been arranged in five groups. The first group is designed to define
the nature of the utilisation of flora and fauna. The next three relate to the three core
ESD objectives. The last question attempts to encourage a synthesis and comparison
of alternatives to assist in achieving the best ESD outcome.

The Question Set is:

Questions related to the nature of flora and fauna utilisation
1. How are the flora/fauna and ecosystems utilised?
2. What is the history of utilisation and the current status of the flora/fauna and the
ecosystems involved?

Questions relating to the welfare and well-being of the individual and community
3. What benefits does this utilisation contribute to the individuals involved?
4. What benefits does this utilisation contribute to the community?
5. Will these benefits be available to the individuals and to the community in the longer
term?
6. What flexibility is there to change the nature of utilisation to improve its benefits?

7. What alternatives would create the equivalent benefits for welfare and well-being?

Questions relating to equity

8. How are the benefits from this utilisation of flora and fauna distributed between individual people, and between individual people and communities over time?

9. What flexibility is there to change who receives value (and what values they receive) from this utilisation in 5, 10 and 50 years time?

10. How do the benefits from this utilisation match the benefits needed by communities?

11. What factors could alter the fairness of this utilisation?

12. What alternatives exist that would create equivalent or improved equity?

Questions relating to biodiversity and ecological processes

13. How does the utilisation benefit the maintenance of the ecological processes involved?

14. How does the utilisation benefit the protection of biodiversity?

15. What flexibility is there to alter this utilisation to improve the maintenance of ecological processes and protection of biodiversity?

16. What research and scientific knowledge is being published about this utilisation that is aimed at improving the maintenance of ecological processes and the protection of biodiversity?

17. What alternatives exist that would create equivalent or improved maintenance of biodiversity and ecological processes?

Question relating to the integration of welfare, equity and biodiversity maintenance

18. Of the potential alternatives, which offers the greatest opportunity in terms of their capacity to maintain or improve welfare and well-being, equity, and biodiversity and ecological processes?

One of the advantages of the Question Set is its capacity to stimulate lateral thinking; to help people seek at least equivalent, if not better, ways of doing things. The inclusion of questions asking about ‘alternatives’ enhances this capability.

These questions have to be open ended to encourage disclosure, analysis and lateral thinking, especially in terms of alternatives. Nonetheless, a minimum response may need to be defined for the question to be useful. For example, the answer to question eight would need to indicate, at worst, no disadvantage for the utilisation to proceed.

The use of the Question Set was suggested, in the Discussion Paper, for those making submissions to the Inquiry. The Committee has also made use of it when considering the evidence presented to it and as it made its recommendations. As is outlined in Chapter 11, the Question Set is suggested as a mechanism that individuals and industries, and their regulators, can use to review and improve the benefits flowing from the particular utilisation activity.

A theoretical example of the use of the Question Set has been worked up using the wild harvest of kelp. This has been included at the end of this chapter.
Section C - The Management System

While the Question Set provides a tool to assess proposed or existing forms of utilisation, it is essentially a one-dimensional tool. To provide those involved with utilisation activity, whether as a regulator or as a business operator, with an ongoing process for enhancing ESD outcomes, the Committee has developed a Management System.

The Management System uses a ‘Total Quality Management’ approach. This involves a five-part process to implement the ESD objectives. The five steps are:

- a) assessing;
- b) planning;
- c) implementing;
- d) reviewing; and
- e) improving.

More particularly, the Management System is:

<table>
<thead>
<tr>
<th>Part 1</th>
<th>Assessment</th>
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<tbody>
<tr>
<td>Conduct an initial review of the situation, including estimating the values of utilisation in terms of each core ESD objective. (Such a review would be facilitated by use of the Question Set.)</td>
<td></td>
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<tr>
<td>Form conclusions and develop policy that address and advance the three core ESD objectives.</td>
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<table>
<thead>
<tr>
<th>Part 2</th>
<th>Planning</th>
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<tbody>
<tr>
<td>Carry out planning, based on the conclusions of the Part 1 assessment, that realises the potential for increasing the value derived from flora and fauna utilisation in the context of the three core objectives. (The use of the Question Set could help measure and compare potential values of alternative approaches.) Plans to be compatible with adopted policy.</td>
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<thead>
<tr>
<th>Part 3</th>
<th>Implementation</th>
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<tr>
<td>Undertake programs and activity in accordance with the plans.</td>
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<td>Concurrently collect information on performance internally (within the business) and from external sources.</td>
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<tr>
<th>Part 4</th>
<th>Review</th>
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<tbody>
<tr>
<td>Review outcomes in terms of the core ESD objectives and devise better policies and plans. (Such a review would be facilitated by use of the Question Set.)</td>
<td></td>
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<tr>
<th>Part 5</th>
<th>Improvement</th>
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</thead>
<tbody>
<tr>
<td>If necessary, clarify the original objectives, amend the policies (Part 1), revise plans (Part 2) and upgrade the implementation programs and activity (Part 3). Reiterate the process - to create a continuous improvement process.</td>
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</tbody>
</table>

Such a Management System would best be used by the organisations actually using the native flora and fauna. By working through the whole System, managers can progressively capture more of the enduring value of using native flora and fauna.
review, envisaged in Part 4 of the Management System, could, however, be conducted by the regulator, the business directly involved or an agreed external organisation.

The Committee made reference to this five-part Management System as it considered the evidence presented to it and as it made its recommendations.

Ways to encourage the use of the recommended ESD framework by others and the above Management System in particular, are discussed in Chapter 11.

Using the ESD Framework – A Fictional Example
A fictional example of a kelp harvesting and processing business is used to illustrate application of the Question Set and Management System.

Application of the Question Set

<table>
<thead>
<tr>
<th>Question</th>
<th>Answer</th>
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</thead>
<tbody>
<tr>
<td>1 How are the flora ecosystems utilised?</td>
<td>Harvesting of kelp involves dragging the storm-cast kelp from the shore. This is winched on to trucks and then transported to a processing factory. At the factory the kelp is first air-dried then further dried in a wood-fired kiln. Wood for the kiln is provided from an old pine forest. No harvest is permitted across dunes in which wildlife breeds. The ground kelp, which is approximately 80 per cent alginate, is shipped to Scotland for extraction. The extract is worth approximately 1,000 times the value paid for the dried kelp.</td>
</tr>
<tr>
<td>2 What is the history of utilisation and the current status of the flora/fauna and the ecosystems involved?</td>
<td>A local company with an elected Board of Management owns the factory. Harvesters are members of the local community. Each harvester must have a contract with the Board and contracts are tradeable. The number of contracted operators is fixed and relates to what has been assessed as both a commercially viable yield and a sustainable harvest. The ‘sustainable yield’ does not take into account impacts of harvest on beaches. Company objectives are to a) make a profit; and b) provide local employment. Harvest has continued with slow increase in the amount taken over a period of five years.</td>
</tr>
<tr>
<td>3 What benefits does this utilisation contribute to the individuals involved and to the community?</td>
<td>Not all contracts are used, as some holders are no longer young and fit enough to take part in the strenuous work of harvesting kelp. For those actively involved, harvesting is both a pleasurable and useful additional form of employment. Others in the community would like to be able to take up the unused contracts but there is no mechanism for requiring that non-users give up their contract.</td>
</tr>
<tr>
<td>Question</td>
<td>Answer</td>
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</tr>
<tr>
<td>Will these benefits be available to the individuals and to the community in the longer term?</td>
<td>No monitoring of the resource is undertaken so the company cannot answer the question with confidence. The wood supply is nearly exhausted and a switch to diesel will be required for the kiln in the near future. This will increase costs and reduce returns.</td>
</tr>
<tr>
<td>What flexibility is there to change the nature of utilisation to improve its benefits?</td>
<td>Change to the contracting system could require that those who are not actively involved in harvesting sell their contracts. New plantations could be established to provide a low-cost and 'greenhouse'-friendly fuel in the future. They could also be used to control local soil salinity problems.</td>
</tr>
<tr>
<td>What alternatives would create the equivalent benefits for welfare and well-being?</td>
<td>Harvesting of alternative kelps for other products could be explored. Ecotourism has potential and could expand to include more local people.</td>
</tr>
<tr>
<td>How are the benefits from this utilisation of flora and fauna distributed between individual people and communities over time?</td>
<td>The method of issuing contracts has been based on a 'first-come-first-served' approach. This, with the problem of unused contracts, is seen as limiting the distribution of benefits.</td>
</tr>
<tr>
<td>What flexibility is there to change who receives value (and what values they receive) from this utilisation in 5, 10 and 50 years time?</td>
<td>Within two years, those with inactive contracts could be required to put them up for sale. In the longer term, the growing of a fuel plantation could be undertaken by individuals as a means of gaining income. In the long term, the potential to harvest other species and development of an extraction plant could be explored.</td>
</tr>
<tr>
<td>How do the benefits from this utilisation match the benefits needed by communities?</td>
<td>Employment opportunities and diversification are needed. Some of the younger members of the community are gaining employment. The small processing factory and fuel collection also provide employment. There is little potential for growth in employment, however, and the industry offers few openings to those who are not very fit or cannot afford the necessary equipment.</td>
</tr>
<tr>
<td>What factors could alter the fairness of this utilisation?</td>
<td>Releasing unused contracts, a fair system of allocating these contracts and a system for contracting the growing of fuel-wood plantations on private land.</td>
</tr>
<tr>
<td>What alternatives exist that would create equivalent or improved equity?</td>
<td>The greatest need is employment for older and less-fit members of the community. Ecotourism is an option and local arts and crafts sell well. Effort put into coordinating and promoting these could increase the employment opportunities for more people.</td>
</tr>
<tr>
<td>How does the utilisation benefit the maintenance of the ecological processes involved?</td>
<td>There are no evident benefits to the marine community, but also no indications of harm. Using the sun and wood-fuel to dry the kelp removes the dependence on non-renewable fuels. The method of harvest may cause erosion of beaches, but there is no monitoring to check this.</td>
</tr>
</tbody>
</table>
13 How does the utilisation benefit the protection of biodiversity?

There are no obvious adverse impacts, but a survey would be required to confirm this.

14 What flexibility is there to alter this utilisation to improve the maintenance of ecological processes and protection of biodiversity?

A survey could be undertaken to ensure that there is no beach erosion or disturbance of wildlife. If there is evidence of a problem, further restrictions on where harvest can occur could be implemented. Rehabilitation of the pine plantation after removal of trees could extend the areas of natural habitat.

15 What research and scientific knowledge is being published about this utilisation that is aimed at improving the maintenance of ecological processes and the protection of biodiversity?

None at present.

16 What alternatives exist that would create equivalent or improved maintenance of biodiversity and ecological processes?

New plantations could be located to control salinity and could use native species. Surveys could be undertaken on a regular basis to identify impacts and indicate any improvement in management needed.

17 Of the potential alternatives, which offers the greatest opportunity in terms of its capacity to maintain or improve welfare and well-being, equity, and biodiversity and ecological processes?

Kelp harvesting provides social benefit and appears to be ecologically neutral, but is not as equitable as could be desired. Alternative ecotourism and art / craft industries offer benefits to other people. Rather than being seen as alternatives to the kelp industry they may be complementary. The approach which appears to meet the ESD objectives better than the present industry is to involve a community cooperative in developing a greater range of industries that use the natural features of the island. Monitoring is needed.

Application of the Management System

The Management System incorporates a review system that makes use of the Question Set. The planning part of the Management System could respond to the results of the above ‘fictional’ Question Set response by incorporating into the company’s management plan regular survey of the natural resource and involvement of research to monitor environmental impacts. Negotiation of contracts to grow new fuel-wood plantations could also be included in the plan, and the potential for development of alginate extraction within Australia might be explored. As the plan is implemented, results can be used to upgrade environmental management, should it be evident that this is needed.

A change to the contracting process could be used to provide greater equity than was found to currently occur by the responses in the Question Set. A community
coordination program could also be established to expand ecotourism and art/craft development.

As part of the Management Plan’s review process, the company might revise its utilisation objectives. For example these might be expanded to include:
   a) allocation of harvest contracts by tender; and
   b) regulation and monitoring of the harvest so that the kelp is used sustainably.

2 ibid., p. 8.
3 ibid., p. 8.
4 ibid., pp. 8-9.
5 ibid., p. 9.
6 And it is to be the basis of new Commonwealth environmental legislation; Commonwealth of Australia (1998), *Environment Protection and Biodiversity Conservation Bill, Explanatory Memorandum*, Canberra.
12 The Productivity Commission’s final report had been completed at the time of writing (June 1999) but not yet released by the Commonwealth Government.
14 ibid.
15 ibid.
16 ibid.
18 ibid, pp. 26 - 29.
19 This does not mean, however, that the use of every individual plant and animal has to demonstrate that it delivers these objectives, but that the utilisation at the ‘project’, or ‘regional’, or even the ‘industry’ level can demonstrate that it delivers each of these objectives in the long term.
21 Principle 2 of the Biodiversity Strategy.
24 ibid., pp. 3-4.
For example, see Biodiversity Unit (1993), *Biodiversity and its Value*, Biodiversity Series, Paper No. 1, Biodiversity Unit, Department of Environment, Sport and Territories.


CHAPTER 3
COMMERICAL USE OF PLANTS

- INTRODUCTION
- OVERVIEW OF CURRENT ACTIVITY
- FLORICULTURAL USE OF NATIVE PLANTS
- NURSERY INDUSTRY
- BUSHFOODS
- HONEY PRODUCTION
- KELP
- ESSENTIAL OILS
- INDUSTRIAL CHEMICALS, COSMETICS AND PHARMACEUTICALS
- BUILDING MATERIAL AND FIBRE
- AGRICULTURAL USE
- LAND REHABILITATION AND AMENITY

INTRODUCTION

In this chapter the Committee provides a brief description of the various sectors that make commercial use of Australian flora and discusses current and potential commercial uses of such native flora in Victoria. Opportunities and challenges facing each sector are also identified.

The Committee notes that many of the ‘native’ plants commercially used in Victoria either do not occur naturally in the State, or do occur naturally but are not restricted to the State. Accordingly, the use of native flora in Victoria may involve ‘Australian native’ species or ‘Victorian native’ species.¹

The Resource

Australia has one of the largest and most diverse floral resources in the world. Approximately 15,650 species of vascular plants have been described in Australia,² and with large regions of the continent still botanically unexplored,³ it is likely that many other species have yet to be identified. It is believed that, if plant groups such as lichens and fungi were included, the total number of Australian plant species would exceed 30,000.⁴
The Australian flora is distinguished not only by its size, but also by its uniqueness - a result of evolution occurring in geographic isolation over a period of at least 30 million years. Eighty per cent of the Australian flora, and 30 per cent of Australian plant genera, are endemic to Australia. Approximately 3,770 native vascular plant species have been recorded in Victoria, of which 201 are endemic to the State. Although Australia's large range of climates and soil types has produced a diversity of plants, Australian plants have mostly evolved under conditions of low rainfall and frequent burning, and on soils that are generally low in phosphorus and other nutrients. Many Australian plants have therefore developed characteristic adaptations, such as woody stems, small, hard leaves, high oil content, hard fruits and non-deciduous habit.

Early Utilisation of Native Flora

The utilisation of Australian flora has a long history. For over 40,000 years, Australian Aborigines have used an enormous number of native plant species for food, tools, fibre, building and cultural uses. In Victoria, over 1,000 species of plants have been recorded as used by Aborigines. The diversity of plants used specifically for food by Aborigines far outnumbers the variety used by Western societies. It has been estimated that Aborigines regularly used 207 species as food plants, compared with the 94 crops now used in the world. The Committee examines the utilisation of Victorian native flora and fauna by Aborigines in Chapter 6.

The first European settlers did not appreciate the value of the native flora for food. Rather, the early history of the utilisation of Australian flora revolved around their value as ornamentals. This was first recognised in the late 18th century by early English explorers and botanists such as Sir Joseph Banks, who, astonished by the beauty, diversity and uniqueness of the flora, exported hundreds of species to botanic gardens, nurserymen and plant collectors in England. By 1800 there were 170 cultivated Australian species in Britain. Contrary to the enthusiasm shown by botanists and collectors for the Australian flora, most early settlers were not impressed by the native plants, preferring to import the familiar plants of their homeland for use in gardens.

Baron von Mueller, in the latter part of the 19th century, was perhaps the first European to investigate the economic potential of the flora for industrial or amenity purposes. Von Mueller exported native species to many countries of the world. His work was largely responsible for the establishment of eucalyptus oil extraction industries in many other countries of the world, and the use of eucalypts and other species in California to rehabilitate gold-mining areas, and for fuel and building materials.
OVERVIEW OF CURRENT ACTIVITY

Today, commercial uses of native plants in Victoria include the following:

a) Ornament
   i) cut fresh flowers and foliage
   ii) dried flowers and foliage
   iii) garden plants

b) Food
   i) bush foods
   ii) honey
   iii) kelp-derived food

c) Industrial chemicals, cosmetics and pharmaceuticals
   i) cosmetics/ perfumes (essential oils)
   ii) cleaning products, pesticides
   iii) aromatherapy/ naturopathy
   iv) flavouring in food and beverages
   v) pharmaceuticals
   vi) tannins

d) Building materials, mulch and fibre
   i) brush fencing (broombush)
   ii) insulation and mulch (sea grass)

e) Agriculture
   i) pasture
   ii) fodder crops

f) Land rehabilitation and amenity
   i) revegetation
   ii) desalination
   iii) street and public open space plantings.

In addition, Victorian native flora is an integral part of ecotourism industries and recreational/educational activities such as visiting zoos, wildlife parks and botanic gardens. The Committee discusses these aspects of plant use in Chapter 5.

The horticulture industry, which encompasses the nursery and cut-flower (floriculture) industries, provides plants for ornamental and amenity purposes and is currently the largest commercial sector use of native plants in Victoria. These industries, nevertheless, still primarily utilise exotic plant species, with native plants accounting for only a small percentage of overall production. Other uses of native plants in Victoria - for food, essential oils, building materials and fibre, and in agriculture - are still fledgling industries, at varying stages of development.

There are only a few commercial crop plants grown in Australia that are native to it. Those used most are trees for timber (excluded from this Inquiry) and native wildflowers. While a range of other species is grown, few are considered ‘mainstream’
crops. Macadamia nuts, melaleuca for oil, and dhuobisia for alkaloid extracts are perhaps the only exceptions.

There are a number of reasons for the increasing interest in the utilisation of Victoria’s native flora. Proponents believe that not only does it make good economic sense to use a largely untapped resource, but such use may have conservation and environmental benefits. For example, some argue that, where a commercial value is attributed to threatened native plant species, their survival is aided because financial incentives encourage artificial propagation and cultivation.

The use of native plants may also have benefits over the use of exotic species because native plants are generally better suited to Australian conditions, and thus generally require less water, fertilisers and pesticides. The use of native plants may provide opportunities for struggling rural communities, providing sources of alternative income to traditional crops or an income from land that is degraded or unsuitable for other crops. Thus there is potential for native bush food or ornamental plant crops to fulfil a dual purpose in land rehabilitation programs. In addition, use of native species in amenity planting and in urban gardens has a conservation benefit by providing habitat and food sources for native birds, mammals and insects.

Utilisation of native plants may therefore have both commercial and conservation benefits. The Committee notes that utilisation must nevertheless occur within a suitable management framework, otherwise there is a danger that commercial imperatives will override conservation objectives.

**FLORICULTURAL USE OF NATIVE PLANTS**

Australia produces a range of native and exotic fresh cut flowers and foliage, as well as dried and preserved flowers for domestic and export markets. About 85 per cent of the flowers sold in the Australian domestic market are traditional exotic flowers. Victoria is the major Australian producer of such flowers, with the farm-gate value of production estimated at $112-152 million. By comparison, the majority (about 90 per cent) of Australian fresh and dried flower exports are native species. The opposite pie chart shows flower exports from Australia by type in 1995-96.

On a world scale, Australia’s flower industry is small. The majority of cut flowers are grown and consumed in the Northern Hemisphere, with Western Europe (particularly the Netherlands) the largest producer and consumer, followed by Japan and the USA. The supply of flowers from the Southern Hemisphere to northern markets tends to follow a north-south axis. Countries such as Israel and Zimbabwe therefore mostly supply Europe; Australia’s primary markets are in Japan and the USA.
It is estimated that the world trade in cut flowers is currently worth around $40 billion. Of this trade, 1 per cent, or $400 million wholesale, is in Australian wildflowers, with Australia supplying only about 10 per cent ($40 million)\(^\text{19}\) of world production, about $27 million of which is exported.\(^\text{20}\)

Historically the wildflower industry was based on bush-picked material, particularly in Western Australia. Conservation concerns, however, and market factors such as demand for high-quality product and consistency of supply, has driven the industry towards cultivation. In 1995-96 about 15 per cent of Western Australia’s production was from wild-harvest, compared with about 50 per cent in 1985.\(^\text{21}\) In Victoria, the vast majority of wildflowers are cultivated.

Victoria exported $7.3 million worth of flowers in 1998, and is the second-largest Australian exporter (22 per cent) after Western Australia. The majority of these exports are wildflowers. Western Australia, which currently dominates the wildflower industry, accounts for 53 per cent of floral exports.\(^\text{22}\) The Committee notes that not all of the product exported from Victoria is grown here; some is cultivated or wild-harvested in other States. The percentage of floral exports by State is shown on a pie chart on the next page.
The top three native-flower exports from Australia are wax flowers (Chamelaucium spp.), kangaroo paws (Anigozanthos spp.) and Grampians thryptomene (Thryptomene calydera). These species are all ‘fillers’ or ‘focal fillers’ for floral arrangements. Filler flowers are typically lower-value, higher-volume products. Australia also exports high-value ‘feature’ flowers, such as banksias, proteas and waratahs. Western Australia is the major producer of wax flowers and kangaroo paws, which are endemic to that State.

Other wildflower species currently exported include those from the following genera:
- a) Banksia;
- b) Leucadendron;
- c) Protea;
- d) Boronia; and
- e) Erica.

Australia’s main markets for wildflowers in 1995-96 were Japan ($14.4 million), the USA ($4.6 million), the Netherlands ($3.2 million) and Germany ($2.2 million). Although historically Japan has been the main market for flower export from Australia, the Japanese recession has forced exporters to explore new opportunities in South-east Asia.
Australia wildflower exports have increased dramatically over the last 13 years, growing from $1.3 million in 1983 to $27.5 million in 1997-98.

Dried Flowers and Foliage

Dried flowers are a significant component of floral exports from Australia. The export value of dried and preserved cut flowers and foliage more than tripled between 1988 and 1996-97 to $10.38 million, and evidence suggests this is the fastest-growing sector in the Australian wildflower industry. Victoria is currently the largest Australian exporter of dried flower and foliage products, accounting for 40 per cent of exports.26

The billy-button daisy known as ‘drumsticks’ (Pycnosorus globosus), which is wild-harvested by two or three pickers from roadsides and private lands in the north of Victoria, is used as a dry flower.27 Recent developments include the use of juvenile bracken (Pteridium esculentum) as a dried product for use in floral arrangements.28 Many native grasses, which have an attractive appearance when dry, are also suitable for this use.29 Plantation-grown eucalypt foliage is being used to create preserved dried plant material, using a newly developed Australian technique of imbibition.30 As with a number of innovative enterprises that use native species, this development was undertaken by an established business working in a related industry.31

Distribution

Flower growers may sell direct to retailers or sell through a wholesaler. A large proportion of growers avail themselves of major distribution centres. The Committee
observed one of the world's largest auction houses - the Aalsmeer Flower Auction. This is operated by a cooperative of growers and uses a 'Dutch auction' system (first bid wins). It operates a strict quality program - all flowers are graded by auction-house staff prior to sale (and any defects listed). Products of low quality are not accepted for sale. Quarantine standards are, however, much lower. An abutting wholesale market area has been established in recent years to assist smaller buyers - charging the auction selling price plus a fixed loading. Initiatives currently under development include electronic commerce (remote buying), greater emphasis on cool room storage, self-inspection schemes and direct transport links to a nearby airport.

In Victoria a 'National Flower Centre' was established three years ago, as part of the Melbourne Market Authorities’ business at Footscray. Unlike the Dutch auction houses, the centre is owned by a public authority and growers rent space to sell their product, with wholesalers also renting space. The whole centre is air conditioned, with cool rooms provided, and remote selling is being investigated. The Authority is a foundation partner in the Australian Quality Assured Flowers program, which is a voluntary program. Health and disease inspections are undertaken by Agriculture Victoria staff. The Authority is not involved in the health and quality of products that a grower may choose to sell - it offers a convenient place of sale.

**Victorian Industry**

Victoria grows the Western Australian endemics, wax flower and kangaroo paw, and other Australian species, as well as South African proteas. However, the Grampians thryptomene (*Thryptomene calycina*), which is endemic to Victoria, is the State's main native-flower crop. The flower industry in Victoria based on native species is currently estimated to be worth about $7-8 million, growing at 10-20 per cent per annum, with thryptomene production alone currently estimated to be worth $0.5-2 million. Other commercially important native species grown in Victoria include wax flower, rice flower, waratah, ixodia, banksia and boronia.

It is estimated that, in Victoria, wildflowers are grown by 128 producers, on a total of 415 hectares. This represents 23 per cent of Australian wildflower growers and 19 per cent of the area under wildflower cultivation in Australia. The majority of wildflowers are field grown, with individual holdings generally less than 5 hectares in area. An important characteristic of the wildflower industry is that wildflowers are not the main business activity for the majority (64 per cent) of producers in Victoria.

There are four major locations of wildflower production in Victoria. These are listed below, together with the major wildflower grown in that area.
Table 3.1 Major wildlife production locations

<table>
<thead>
<tr>
<th>Region</th>
<th>Wildflowers grown</th>
</tr>
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| Melbourne region, mainly in the Dandenong Ranges and the Mornington Peninsula | Boronia  
Protea  
Banksia  
Eucalyptus  
Leucadendron  
Leucospermum  
Waratah  
Thryptomene |
| South West region, mainly around Warrnambool | Ixodia  
Boronia  
Agonis  
Leptospermum  
Eucalyptus |
| North Inland (Grampians, Horsham, Mildura) | Thryptomene  
Geraldton wax  
Ixodia |
| Gippsland | Protea  
Leucadendron  
Serruria  
Eucalyptus  
Waratah |

The Committee visited a large wildflower farm in the Grampians area - the Mount Talbot/Black Range Thryptomene Farm. The main crop produced is thryptomene (Thryptomene calycina), which is indigenous to the area. Other species grown include eucalyptus (for foliage), riceflowers (Ozothamnus), wax flowers (Chamelaucium), boronia, and ericas. New varieties are introduced every year, sourced from specialist plant breeders. Most of the crop is exported - to USA, Canada and Japan. The enterprise operates over a number of properties covering some 1200 hectares, requiring only small inputs of artificial watering and fertiliser application.

The nature of this operation is in marked contrast to those that the Committee had the opportunity to visit in Israel. The largest flower grower visited there operated on 25 hectares, with another very successful farmer operating on four hectares. These farms rely on high inputs of technology and infrastructure to artificially manipulate the growing environment - but produce similar quantities of wildflowers to the Victorian enterprise (20 tonnes per week).

Detailed statistical information on the number of growers and types and value of products is not available.
Overview of Selected Individual Species

The following summary has been based on material included in the landmark reference book by Johnson and Burnett and a handbook prepared by the Rural Industries Research and Development Corporation.

**Wattles (acacias)**
Many wattles flower prolifically and have attractive foliage. They are also tolerant of most soil types and a wide range of climate. Most current production is in coastal Australia, including in Victoria, and is based on relatively few of the 800 species of the genus. The most commonly grown species are Cootamundra wattle (Acacia baileyana and Acacia baileyana purpurea) and silver wattle (Acacia dealbata). They are sold to the domestic and export markets, with Asia (especially Japan) the focus of export, but plants also going (as ‘mimosa’) to Europe and USA. Wattles are also cultivated in Europe and Japan.

**Banksias**
Banksias are visually impressive, have long shelf life and are available in a variety of colours and forms. They are sold fresh and, to a lesser extent, in dried form. From an export perspective, they are readily identifiable as Australian (now a market-attractive selling point). They are widely grown in southern Australia, including Victoria, and sold in fresh and dried form. Most production is geared to the export market, particularly to Japan, but the market is still expanding - into other Asian and European countries. Most banksias are propagated via seed collected from native stands, although cultivated seed and rooted cuttings are becoming available. New cultivars are continuously being developed. ‘Birthday candles’, a now very popular dwarf form of the hairpin banksia (Banksia spinulosa), was developed in Victoria.

**Boronia**
Boronia offer scented and attractive flower displays. They are grown in southern States including Victoria, mostly from cuttings (they are also grown in New Zealand, California and Israel). Wild-picked material is still important in Western Australia. The dominant domestic and export crop is the red boronia (Boronia heterophylla). Export markets are growing and include Asia, Europe and Canada. They are comparatively difficult to grow, have a short flowering season and short vase life, attributes being addressed by current research and development.

**Eucalypts**
The juvenile foliage of many eucalypts is attractive and is sold in many countries around the world. More recently a market has developed for buds, open flowers and gum nuts. Lack of uniformity in yield and quality are issues currently being addressed by the industry. Australian suppliers compete against those in France, Italy and USA. The main species grown for foliage production are cider gum (Eucalyptus gunnii), silver-
leaved mountain gum (Eucalyptus pulverulenta) and silver-leaved stringybark (Eucalyptus cinerea), with at least another 20 species also grown.

**Geraldton Wax**
Geraldton wax (Chamelaucium uncinatum) is endemic to Western Australia, but is now grown in other States, including Victoria, and overseas. A number of varieties have been developed. It is Australia’s leading wildflower - and has reached the top 20 plant species sold (by volume) in Europe. It has high productivity, good vase life and is most useful as a ‘filler’ in flower arrangements and posies. The major producer of Geraldton wax is, however, Israel - Australia exports less than 10 per cent of the world production. It is also grown in California, Mexico, Brazil and southern Africa.

**Ixodia Daisy**
In the past production of ixodia or mountain daisy (Ixodia achilleoides) was based on wild-harvest from native stands in South Australia, but it is now cultivated there as well as in Western Australia and Victoria. Ixodia is currently mostly sold dried, but also has potential as a fresh flower. There is currently much interest in the plant in overseas markets because of its durability, appearance and suitability for drying.

**Kangaroo Paw**
Kangaroo paw is a significant and stable export product. It is readily identifiable in international markets as Australian - a strong selling point. The attractive blooms are also used for landscaping and pot plants. To date Australia has been the major source of new varieties, although Israel in now also producing them. There are a number of species grown, with black kangaroo paw (Macropidia fuliginosa) the most highly sought, but hybrids of the tall kangaroo paw (Anigozanthus flavidus) are the species most commonly grown. In recent years other countries have been growing them, including Zimbabwe.

**Rice Flower**
The rice flower, *Pimelia*, was harvested solely from the wild in New South Wales and Queensland until the late 1980’s. It is now grown in a number of other States, including Victoria, and in the USA. It is generally sold as a ‘filler’ flower for flower arrangements, primarily in Japan and the USA. Ninety per cent of production is exported. Cultivated plants continue to make use of the natural variety found in the wild stock, although a limited number of cultivars are mostly used.

**Thryptomene**
The industry is based on one species, the Grampians thryptomene (Thryptomene calyquina), and is almost entirely produced near the Grampians, within its natural range. Most of the annual production of 10 million flowering stems (1998 figures) is exported - it is the largest flower export from Victoria. It is sold to the USA, Europe and to a lesser extent Asia. Limited development and use of cultivars, poor husbandry and post-harvest handling reduce potential quality, but these aspects are being
addressed by the industry. A number of superior cultivars have been developed by Victoria’s Institute of Horticultural Development, but are not generally available.

**Industry Strengths**

The combination of an increasing world population and a forecast increase in the per-capita consumption of cut flowers due to increasing urbanisation,\(^3\) indicates that there is potential for considerable growth in this sector. As consumption of all cut flowers increases, use of wildflowers is also likely to increase. A defining characteristic of the world flower trade is that, even though traditional flowers remain a mainstay of the industry, there is constant demand for new and unusual flowers for niche markets. Australia, with its vast and unique floral resources therefore has an inherent advantage over many of its competitors.

Australian-grown wildflowers are internationally accepted:

The [Flower Export] Council [of Australia] promoted Australian wildflowers at the premiere flower trade display, the Aalsmeer flower show, in Holland in November last year, and its display won a gold medal, reaping huge benefits by making international buyers aware of what is available from Australia, and particularly its quality.\(^39\)

Although distance from the major world markets is generally a disadvantage, it confers one advantage - the seasonal differences between the Northern and Southern Hemispheres. Australia is able to supply northern markets during their out-of-season periods. The sheer size of Australia and its diverse climate also mean that flowers can be supplied from a number of locations and latitudes, thereby extending the supply period. In addition, the ‘woodiness’ of many Australian native cut flowers (for example compared to ‘soft’ exotic flowers like gerberas) allows native flowers to maintain their quality during long-distance transport. Australia’s proximity to markets in South-east Asia represents another opportunity for Australian exporters, who have advantages, through lower freight costs and shorter delivery times, over competitors for these markets.

With traditional flowers dominating the domestic market, there is also potential for greater appreciation and use of Australian flowers and nursery plants in their country of origin.

Native wildflowers offer landowners a diversification opportunity, particularly of growing ‘commodity crop’ species such Geraldton wax (Chamelaucium uncinatum) on contract, which exposes the farmer to less risk. A representative of Greening Australia noted that “the beauty of farmers getting into growing native plants - they do not have to put in a rotary dairy for $250,000”.\(^40\) Others offer a contrary view, advocating that success requires a major commitment to the product - with both expertise and financial resources required.
Industry Challenges

Although Australia’s location in the Southern Hemisphere provides a seasonal advantage, Australia competes for northern markets with many other producers of Australian wildflowers. Our distance from northern markets is a disadvantage in terms of freight costs and delivery times. Israel, which predominantly supplies Europe, is a key Northern Hemisphere competitor. Horticulturists in Israel recognised the commercial potential of the Australia flora many years ago, and developed species such as wax flower for commercial use.

Israel now produces and exports greater quantities of Australian native flowers than does Australia. In 1997 Israel produced 76 million stems of wax flower and 22 million stems of kangaroo paw. In the same year, Australia exported only 4.9 million stems of wax flower and 0.46 million stems of kangaroo paw. Israel is now looking beyond European markets and targeting Asia, in direct competition with Australia. With its focus on high investment and technology, Israel has extended the flowering season of wildflower products and in some cases has undermined Australia’s seasonal advantage. Other Northern Hemisphere competitors include California and Mexico.

In the Southern Hemisphere, increasing competition is coming from New Zealand, South Africa, Kenya, Zimbabwe, Colombia, Peru and Chile. Producers in developing countries in the Southern Hemisphere have similar climates and pose perhaps the greatest threat to Australia due to their lower costs of production (that is labour), particularly where they are supported by Northern Hemisphere technology and investment.

NURSERY INDUSTRY

The farm-gate value of nursery production in Victoria is conservatively estimated to be $260 million. Most of this production is based on exotic species, with only a few nurseries specialising in Australian natives or plants indigenous to Victoria.

There are no data available on the size of the domestic market for Australian native nursery plants. It is, however, a long-standing sector of the industry, with an authoritative reference, published in 1997, listing some 1600 species that are available in the nursery trade. Of these, a 100 were added in the last four years. Austraflora, a wholesale nursery, has been selecting and developing Australian natives into horticultural use for over 30 years, and has now over 50 registered varieties.

There is also no separate commodity classification for exports of live Australian native plants, but the majority of exports of live, wild-harvested and artificially propagated plants are cuttings; and are believed to be mainly Australian natives. The value of such exports in 1997-98 was estimated to be $A3.1 million.
There has long been a reliance on exotic plants for public and private gardens. A particular advantage of using Australian plants in gardens is that pests and diseases are not usually major problems. Their uniqueness is a strong selling point.

Export markets are limited by the bulk and weight of the product, as well as quarantine restrictions associated with the import of soil and live material. Cuttings are now being used, however, with a limited range of native species, such as banksias, now being exported live.

Nurseries also have a role in taking pressure off species that are rare in the wild, by propagating plants for sale. Examples of rare plants used in ornamental horticulture include:

a) Rulingia prostrata, and
b) the recently discovered Wollemi pine (Wollemia nobilis).

**Victorian Industry**

There are two main sectors - wholesale nursery operations and retail nursery operations. Such nurseries provide plants for private gardens and for rehabilitation work. The Committee undertook inspections of examples of both kinds of operation.

While native plants are sold by many mainstream retail plant nurseries, an increasing number now specialise in indigenous plants. At least nine major Victorian nurseries stock a substantial range of Australian plants. In total, there are nearly 200 nurseries across Victoria listed by Greening Victoria as supplying indigenous plants.

The Committee visited Kuranga Native Nursery, a specialist nursery established in 1983. The nursery propagates and grows 80 per cent of the stock sold, with new specimens collected, under permit, for selective breeding. Several varieties developed by the nursery are protected under Plant Breeders Rights. The nursery also stocks plants developed by other companies. Like many similar nurseries stocking Australian natives, many customers seek ‘bird attracting’ plants without regard to their source. Kuranga has observed an increased awareness of indigenous plants. It encourages this trend by selling tube stock based on local provenance. The importance of producing reliable plants, and ensuring that the right plant is grown in the appropriate location, was highlighted to the Committee.

Many of the State’s wholesale nurseries are in the Dandenong Ranges, one of which, Proteaflora, was visited by the Committee. Proteaflora was established in 1974 as a specialist cut-flower grower and production nursery. The company specialises in growing plants of the Proteaceae family, mainly South African natives but also a number Australian species such as banksias and waratahs.

Proteaflora’s major market is domestic retail nurseries, but it also provides stock to local cut-flower growers. Thirty per cent of production is exported. Given the high
cost of exporting nursery products (due to their bulk and weight), Proteaflora now provides expertise to assist overseas growers (in Japan) to cultivate the young plants, and receives a royalty on sale of the final product. The company is also developing similar arrangements for the European market.

A strong focus of Proteaflora’s operation is in-house research into the development of new cultivars and the improvement of grafting techniques. They have developed a number of what are now popular garden plants. Unlike the broad-acre cut-flower operations the Committee visited in the Grampians, the plant nursery is a high-tech operation on a small site. All plants are grown under carefully controlled environmental conditions in potting media (pine bark and peat) with drip irrigation. Cuttings are struck in heated beds - in greenhouses where computers monitor temperature, humidity and light levels, and adjust retractable walls. Strict hygiene regimes are maintained.

In Victoria there are also at least two specialist nurseries that provide material to growers of bushfood plants - the CERES Permaculture and Bushfood Nursery in Brunswick and the Pomonal Native Nursery at Pomonal (on the edge of the Grampians).

**Industry Strengths and Challenges**

There is a movement towards greater use and appreciation of native plants - reflecting the desire for a more ‘ecological’ approach to landscape management that responds to increasing pressures on water and financial resources; and environmental concerns such as recreating habitat for native birds and animals. Such factors represent an excellent opportunity for the development of the domestic market for native and indigenous plants.

Proteaflora is an example of how innovation in development and marketing of products, coupled with strong management skills and strict quality regimes, can lead to success in overseas markets.

The need for business strategies that are committed to long-term development and sustainability was noted by the Nursery Industry Association of Victoria. They commented that, with reference to potential export markets of the tree fern, *Dicksonia antarctica*, in the past “the ‘Aussie thing’ ... [was to] fail to supply after the initial effort - or worse still - flood the export market with substandard product”.  

**Tree Ferns**

The soft tree fern (*Dicksonia antarctica*) is sold by nurseries and retail outlets across Australia. It is an endemic to Australia and found widely in wet forests in Victoria. In 1996 an estimated 70,000 tree ferns were legally harvested in Victoria. *Cyathea australis* is also produced, albeit to a much lesser extent.
Most soft tree fern plants in Australia are wild-harvested, although in recent years plantation production has been developed. The tree fern is robust and can be cut, stored, transported and regrown successfully. It will regrow from the stump of harvested plants. It is particularly suited to garden planting and landscaping purposes and is the second most common propagated tree fern in the world (notably the USA). Victorian product is exported to Holland, France, England, Italy, Germany, South Korea and Taiwan.\(^5\)

Wild harvest in Victoria is currently only permitted on private lands, but access to public land sources is being sought by some harvesters. A large number of tree ferns sold in the Victorian market are wild-harvest product imported from Tasmania.

Plantation-grown product appears to have difficulty competing with wild-harvested. The cost of production is presumably greater than the royalty payable for wild material.

The proprietors of a tree-fern business in the Otways called Mr Fern, have prepared estimates of the size of sustainable tree-fern operations, assuming an annual harvest of 20,000 stems:

a) plantation - 15 hectares with harvesting on a 15-year rotation;
b) bush harvesting - 150 to 200 hectares;
c) integrated operation with logging - 2 coupes per annum.\(^5\)

The Nursery Industry Association of Victoria believes that the export market is probably currently worth $1 million per annum but could quadruple in the next five to six years, provided that:

- the bureaucrats facilitate - export;
- the efficient use of raw material inputs (particularly access to water);
- planning permits and licensing requirements.\(^5\)

Soft tree ferns have a particular export advantage in European countries, as Europe's temperate climate is similar to that of Victoria - many other species available on the world market are tropical species.\(^5\)

Some of the ecological and regulatory issues associated with wild-harvest of tree ferns are discussed further in Chapters 7 and 8.

**BUSHFOODS**

While the consumption of native plants is intrinsically linked with the traditional Aboriginal lifestyle, and pioneering European settlers experimented with a limited range of native plant foods,\(^6\) it is only since the mid-1980s that the commercial bushfood industry has become established.

Until recently most bushfoods have been obtained from tropical and arid/semi-arid environments. Wild harvesting from public lands under licence is the most common
form of primary production, though to a lesser extent than in the past; economic pressures are moving the industry towards plantation production. Wild-harvesting can provide a useful economic activity for remote Aboriginal communities.

Production of foods based on the plants of the temperate climates of Victoria has only been developed in the past few years, although producers in Victoria now grow an array of such species. The initial development was based on wild-harvesting, with the emphasis now on cultivation for production.

The farmgate gross value of the industry in 1995-96 was estimated to be $10-12 million. Raw materials are produced in all Australian States. The main bushfoods produced, as measured by annual tonnage of raw produce (1995-96 figures), were wattle seed (6 tonnes), bush tomatoes (5 tonnes), and quandong (5 tonnes).

The raw materials used by the industry include fruit and berries, nuts, leaves and seeds. These are sold in fresh, frozen, dried and roasted form. Special preparation may be needed to make good use of some of these foods.

Food plants include many suited for use as highly flavoured herbs, spices and flavourings. While these are currently the predominant products, others are used as vegetables and fruits. Value-added products include chutneys, sauces, syrups and cordials, oils and dressings, pasta, pesto, pate, and jams and marmalades. The marketing emphasis has moved away from 'bush tucker' to a gourmet food image.

The industry consists of a number of sectors:
   a) producers, including wild-harvesters and plantation based;
   b) processors;
   c) the restaurant trade and (specialist) retailers.
Vertically integrated operations as well as single-purpose cottage-industry-scale businesses operate. There is little wholesale trade and some nursery operations.

Primary production methods include:
   a) wild harvesting - permitted under licence on private and Crown lands;
   b) ‘passive farming’ – using managed wild stands to sustain and increase yield;
   c) cultivation using mixed species and genetic stock; and
   d) conventional cultivation – with single-species stands of cultivars selected for quality, yield and consistent response to horticultural methods, including mechanical harvesting.

Victoria has an active bushfood producers’ organisation, the Southern Bushfood Association. While it has some 180 members across southern Australia, only 20 or so are commercial growers and collectors. Currently the key production area in Victoria is in South Gippsland, but producers are now establishing in the north-east of
the State and elsewhere. The bushfood industry in Victoria is estimated to be worth $1m annually and is steadily growing.68

The Macadamia tree (Macadamia integrifolia) is the most widely grown Australian plant used for food - both in Australia and overseas. Indeed macadamia nuts are now considered a mainstream agricultural product rather than a bushfood.

The largest commercial plantations of other Australian bushfoods currently comprise, in order of the number of plantings:69

a) quandong - the fruit of Santalum acuminatum;
b) bush tomatoes - the fruit of Solanum centrale;
c) muntries - the fruit of Kunzea pomifera;
d) lemon aspera - the fruit of Acronychia acidula; and
e) lemon myrtle - leaf and oil of Backhousia citriodora.

Of these, only two are currently grown in Victoria (quandong and muntries). A wide array of other species is grown in plantations of smaller commercial or potentially commercial size. Within Victoria these include:

a) wattle seed - seeds of Acacia spp;
b) mountain pepper - leaves and, to a lesser extent, fruit of Tasmannia lanceolata;
c) warrigal greens - leaves of New Zealand Spinach (Tetragonia tetragonioides);
d) mints - leaves of, for example, Prostanthera rotundifolia and Mentha australis;
e) aniseed myrtle (Backhousia citriodora) - for flavouring; and
f) cider gum (Eucalyptus gunnii) - its sap is used as a sweet syrup similar to maple syrup (being manufactured near Mansfield).

Such species are cultivated as mono-crops or as mixed-species plantings. The Committee inspected the property of Tarnuk Bushfood and Flowers. This producer has used permaculture principles to establish plantings of an assemblage of species that provide overstorey, understorey and ground cover, which they have found facilitates the control of pests and diseases and soil improvement - as well as providing a diversity of products for harvest. They currently produce products from ten different species.

The responses to a questionnaire organised by the Victorian-based Southern Bushfood Network in 1996 indicated that its members were growing or proposing to grow over 50 different species.70 Even so, this is only a very small part of the potential:

Only recently has there been any attempt to explore the potential of these species [that is the one-third of Victorian plants used by the Aboriginal community in the past] for modern use, and this has often been by dedicated amateurs.71

While the record of traditional Aboriginal use is inevitably incomplete, recent research into historical records and retained traditional knowledge, by individuals such as Dr
Beth Gott, an ethnobotanist from Monash University, has indicated that a huge array of Australian plants are potentially edible. Some 900 plants are known to have been used by Aboriginal people up to the 1830s. Moreover, it is also known that not all edible foods were used (for instance products made palatable by boiling were not used, as traditional Aboriginal culture did not have the technology to boil food).

**Processing of Bushfoods**

While there was effectively no processing of Australian bushfoods in Victoria some 10 years ago, there is now an array of businesses involved in the sector. These include:

- confectioners;
- pasta manufacturers;
- makers of gourmet herbs, savoury sauces, conserves, jellies, jams, salsa and pesto;
- makers of flavoured biscuits and breads; and
- makers of flavourings for drinks.

The Committee had the opportunity to visit a number of businesses that process bushfoods. One of these, Robins Bush Foods, only produces foods derived from Australian native plants and has been a pioneer in the industry. It has been in business since 1988. The company produces a range of jams, jellies, chutneys, relishes, pickles and syrups from raw material obtained from around Australia, from both wild-harvest (including that obtained from remote Aboriginal communities) and plantation sources. Their products are sold in supermarkets and delicatessens, and to the food service industry - restaurants and internationally focussed resorts and hotels and airlines. They export to supermarkets such as Sainsbury's in the United Kingdom. To assist in the development of a market for their product, they have published recipe books, undertake a range of promotions and, more recently, place great emphasis on the design of labels, description of products and style of container.

Other processors use bushfoods as an ancillary line. The Committee inspected the factory of Casalare Specialty Pastas, a small family business based in South Gippsland. The business produces specialist pastas and has recently developed five lines under the 'Bush Pasta' label. Production has grown steadily, in line with market development. The proprietors consider that the rural-town location has reduced all costs except for freight. It is also well located with respect to supplies of raw bushfood product.

Use of bushfoods in the restaurant trade is primarily in specialised businesses. One such business is the Flamin’ Bull and Bush Restaurant in Warragul, which was visited by the Committee. The business was established in 1990 and offers a menu of overtly Australian fare. It employs koori staff and actively involves them in program development. Bushfoods are obtained from interstate and locally (the latter mainly fish, emu and some vegetables). The proprietors plan to open new outlets under
franchise and there is interest by others in obtaining supplies of its in-house products, such as sauces made to traditional Aboriginal recipes using native plant ingredients.

Tourist operators and specialist food retailers, such as those based in international airports, also supply and sell bushfoods.

While in South Australia, the Committee had the opportunity to talk to the proprietor of Australian Native Produce Industries. This company operates as a vertically integrated business. The company focuses on approximately 14 native species, using mostly patented plant varieties. To assure reliability of supply it has recently established its own nursery operation (which was visited by the Committee). The business seeks experienced growers and supplies them with material. The resultant crop is then purchased by the company.

**Industry Strengths**

There is considerable interest within the horticultural and agricultural community in producing bushfoods, and plantation development is leading to increased quality and quantity. This, in turn, is increasing demand. Bushfood plantations also offer improved land management, as many plants are perennial (and thus require less tillage and enhance retention of organic matter) and are acclimatised to the local environment (and consequently may be less prone to pest damage). The industry offers opportunities for farmers to diversify.

From a manufacturer and retail perspective, bushfoods have a number of advantages over mainstream foods. It is claimed that they offer “uniquely different flavours” and “excellent nutritional qualities”, the latter of particular relevance in the current consumer market where health and nutrition are important. The industry is also well positioned to capitalise on Australia’s tourism and growing ‘fine foods’ reputation.

Not only is there interest and potential in the industry, but it has experienced real growth. The Southern Bushfood Association noted that in Victoria:

> In the past three to five years there has been a significant growth in the number of individuals and groups involved [in Australian native foods] ranging from harvesting, marketing, educating and training, involvement in the horticultural industry, food research and plant development and so forth.

Victorian producers are close to major markets and produce a niche product that can command premium prices.

**Industry Challenges**

According to Rural Industries Research and Development Corporation research, and confirmed in the Committee’s discussions with some of the Victorian operators, key
issues include the need to reduce production costs, maintain quality standards and ensure reliability of supply.

The Corporation’s research also indicated that “at present [1998] the industry is poorly developed, [and] businesses are generally under-capitalised …” Agronomic information is limited, as is knowledge of post-harvest procedure. Production and harvesting is labour intensive (there is limited mechanical harvesting), resulting in high labour costs, and yield and quality are restricted by limited genetic development of plant material. From the manufacturers and retail perspective, key issues are the inconsistency of supply and product quality, high cost of raw product and lack of identified consumer demand.

Wild-harvesting, in particular, involves uncertainty of supply and quality, and high harvest and freight costs. Conventional cultivation can assist in overcoming these problems. Consequently the pressure is to move from wild-harvesting to conventional cultivation. However, it has been difficult to interest mainstream farmers in growing these crops and hobby farmers tend to be unable to provide reliable and adequate supplies.

The requirements of conventional cultivation and harvesting methods may restrict the species that can readily be used. Monocultures incur disease and pest problems, as well as vulnerability to fluctuating prices for products. These factors affect native species as much as any other crop. It has been suggested that mixed-species cultivation, by mirroring natural ecosystems, may overcome some of these problems, as well as reduce land degradation. Testing methods to manage such systems within the context of modern agricultural production is in a very rudimentary stage.

Market development would be assisted if nutritional and toxicological information were available for both existing and potential food species. Limited analyses have been undertaken but more are needed. These have shown a number of species to have high nutritional value; for instance some of the purslanes (Portulaca spp.), love-grass (Eragrostis spp.) and kurrajongs (Brachychiton spp.) have excellent protein and fibre contents. Some with food potential require treatment to remove toxins before they can be used.

A number of the key commercial species are briefly reviewed below.

**Macadamia Nuts (a potential Victorian sector)**

As noted above, the macadamia nut is the most successful native Australian plant used for food production. While it is a rainforest species, it has been grown successfully in areas with climatic conditions similar to those found in parts of Victoria.

The two species of macadamia that are grown for food were originally found in rainforest areas on the border of Queensland and New South Wales. The food value
of macadamia nuts was known in Australia from an early time - Aboriginal people used them as a traditional food and Australian botanists were urging their development in 1900.\textsuperscript{67}

Macadamia was, however, first developed as a crop in Hawaii, 70 years before it was established in Australia.\textsuperscript{88} Even today, many of the cultivars grown in Australia come from the USA. The species is now an established agricultural crop around the world. It is grown commercially in southern Africa, central America, Brazil and New Zealand, with Hawaii still the largest commercial producer in the world.\textsuperscript{89}

The primary product of the plant is the nut, which is eaten raw or roasted, or as an ingredient in bakery products. It is also used to produce a cooking oil (as well as cosmetics and soaps).

In 1991-92 the gross value of the Australian macadamia industry was $23,605,000, with growth in gross production of $621,000 in that year. It is an export-oriented industry.\textsuperscript{90} Most of the Australian production was exported (approximately 80 per cent) until a world price downturn led to further development of the domestic market.\textsuperscript{91}

Currently macadamia nuts are not grown in Victoria. They are grown in the Riverland of South Australia under irrigation and, given the similarity of climate, could also be grown in the north-west of Victoria.

\textit{Sector Strengths and Challenges}

Macadamia nuts have perhaps the longest period of development of Australian bushfoods and enjoy established markets.

In Australia, great variation in growing conditions and pests have made it desirable to develop a range of cultivars for specific conditions. This is costly but has proved effective. Initial large capital outlays and the long payback period of ten or more years (the length of time to produce mature yields) have not proved to be a disincentive to this industry.\textsuperscript{92}

Recent overproduction led to some price problems but subsequently to greater cooperation and market development. The current growth pattern of the industry suggests that it is still in a growth phase.\textsuperscript{93}

\textit{Quandongs}

Quandongs (\textit{Santalum acuminatum}), also known as the desert or native peach, are one of the main bushfoods currently produced in Australia.

They are considered by many to have a tart but delicious flavour. The fruit is rich in vitamin C, while the seed provides a protein source and high oil content. Aboriginal
people use the fruit and seed as food and the seed for medicinal purposes; they also use the wood.94 “Early settlers gathered the fruits for pies, jellies and jams.”95 Such foods remain a major end-product of the fruit.

Nationally the industry is worth approximately $250 million.96 As at 1997, commercial plantings of quandong were approximately 40,000 to 50,000 plants.97 Over half are in South Australia, with the other major area of production being in the Broken Hill region of New South Wales. Plantings are mostly between one and four years old.98 Plants may be grown from seedlings or grafted stock.

An orchard has been established near Mildura and others in Victoria are in the developmental stage.99

In recent years producers have been successful in developing a market for the quandong. For instance, quandong-based jams are now sold in Victorian supermarkets, although still only as a premium product.

The plant is very tolerant of soil salinity, but difficult to grow from seed.100 While the full climatic range in which quandongs can be grown successfully is not known, they are established in South Australia in conditions similar to those of northern Victoria.

**Wattle Seed**

Aboriginal people used wattle seed as an important source of protein.101 Seeds were ground into a paste, roasted or eaten raw. Within Victoria, the seeds of at least five species of acacia were used for food - silver wattle (A caca dealbata), coast wattle (A caca longifolia var. sophorae), golden wattle (A caca pycnantha), eumong (A caca stenophylla), and varnish wattle (A caca verniciflua).102

While an array of products has been commercially produced from acacia species for many years, the commercial production of seed for use in processed foods is a comparatively new use.

Culinary uses of wattle seed include as flavouring agents (for example, in sauces, mustards and seasonings), as beverages (using ground and roasted seeds as a coffee substitute or as flavourings for teas), as flour (for bread, biscuits and pasta) and as edible oils.103 As well as being high in protein, the high level of dietary fibre is an added advantage in modern cuisine.

Extracted oil may also be used in cosmetics, and the use of wattle seed in stock mixtures has been proposed.

Research on the potential of wattles as a source of human food is pursued through a number of individuals and groups. A major review of species with particular potential in southern Australia has recently been published. Species of wattle are also being
tested overseas as potential food sources; for instance, four species are being tested in Niger, West Africa.\textsuperscript{104}

The Australian review, which was undertaken by scientists from CSIRO and the Western Australian Department of Conservation and Land Management, identified 47 wattle species with potential for cultivation (in semi-arid areas of Australia).\textsuperscript{105} Of the 47 species identified in this review, 18 were regarded as having the greatest potential. One of these, golden wattle (\textit{Acacia pycnantha}), is widespread in the wild in Victoria. All are found in climates similar to that in the north-west part of the State.

Currently the most important species used by the Australian bushfood industry is bramble wattle (\textit{Acacia victoriae}). Not only do its seeds have good nutritional value, but wild populations have wide adaptability, it is easily propagated from seed, it grows rapidly, can be regenerated by coppicing (that is cutting the tree trunk to encourage growth of new stems) and the seed is easily harvested.\textsuperscript{106} It occurs naturally in Victoria only in the far north-west of the State, and the Committee is not aware of any Victorian harvesting or cultivation.

Other, higher rainfall reliant, species are currently harvested in Victoria. The seed of the coast wattle (\textit{Acacia longifolia var. sophorae}) is wild-harvested in coastal regions of western Victoria.\textsuperscript{107} It is used in a diversity of products such as pasta, sauces and beverages. Self-seeded populations of Cootamundra wattle (\textit{Acacia baileyana}), a species introduced into Victoria from New South Wales, are also harvested, in the Grampians area. It is also being cultivated, as are lightwood (\textit{Acacia implexa}), golden wattle (\textit{Acacia pycnantha}), and wirilda (\textit{Acacia retinoides}).\textsuperscript{108} One of Victoria’s (and indeed Australia’s) larger growers currently produces about 0.25 to 0.5 tonnes of wattle seed per year.\textsuperscript{109} Yields obtainable from mature wild plants may take five or more years to be produced.\textsuperscript{110}

The Committee had the opportunity to visit cultivated plantings of wattle in the Grampians area (Barry Clugston’s property) as well as in Gippsland (Tarnuk Bushfoods), where wirilda (\textit{Acacia retinoides}) is grown as part of a mixed-species planting being developed in accordance with permaculture principles.

Most seed produced in Victoria is sold to local markets - for use in restaurants or bushfood production. Some is exported.

\textbf{Strengths of the Sector}

Many species of wattle produce seed with high potential as a food source, although, at present, the market does not differentiate between the seeds of the various species harvested. Victorian producers are close to major markets and the production of what is currently a niche product appears profitable. Markets are gradually growing.
Wild resources are abundant, they grow readily and many species can easily be cultivated. Wattles bear their pods at the extremities of the plant, so simple adaptation of shaking methods used to harvest some species of nuts could be used to harvest pods. Seeds are easily separated from pods by mechanical means. Formal planting in rows facilitates cultivation and harvesting, and the use of drip watering is successful, with harvesting possible from plantings at three or more years of age.

The abundance of acacias in natural stands has reduced the immediate incentive to cultivate them, but cultivation facilitates mechanical harvesting.

One of the values of acacias for plantation production is that they provide other benefits. They can be used as stock food, for fuel and fine timber, as wind-breaks and for land rehabilitation. They can easily be grown by direct seeding and have low nutrient requirements. Being legumes, they can fix their own nitrogen.

Some species are considered environmental weeds by many - for instance coast wattle (Acacia longiflora var. sophorae) and Cootamundra wattle (Acacia baileyana). Harvesting might provide a useful check to their populations, although seed dispersal to adjoining areas is still likely to occur.

**Challenges Facing the Sector**

Developing wattle species for use in the food industry will require a significant input of research. In particular, if the resource is to compete with more mainstream sources of flour and other products, nutritional and toxicological studies are needed. Given the great diversity between and within species, selection and development of silvicultural and processing methods will assist in obtaining reliable harvests of consistent products. At present there is little coordination of the activities and knowledge of individual growers.

While production is currently responsive to market trends and involves a small number of, in effect, niche producers, there is potential to oversupply the market. A recent research paper, by the Rural Industries Research and Development Corporation, noted that the demand by processors in 1995-96 was around 6 tonnes - an amount that, on a potential yield of 1.25 tonnes per hectare, could be readily supplied from a cultivated area of 5 hectares. Thus potential to saturate the market is high.

The weed potential of species selected for cultivation will also need to be assessed. Coast wattle (Acacia longifolia), golden wattle (Acacia pycnantha) and several other wattle species have proved aggressive in their growth when translocated.

**Muntries**

Muntries (Kunzea pomifera) grows wild in Victoria and has also been successfully grown under cultivation. Its berries, known as muntries (muntries is the Aboriginal name for
the plant).\textsuperscript{116} are a small, crunchy berry with a taste similar to dried (Granny Smith) apples.\textsuperscript{117} Their natural distribution extends across the coast and sandy and limestone areas of western Victoria and south-eastern South Australia.\textsuperscript{118} They were a popular food of Kooris, being eaten raw or beaten into cakes and dried and stored.\textsuperscript{119}

Currently muntries are used mainly in sauces and chutneys. They could also be used to compliment salads or desserts, or in place of apple in pies or muffins. Existing growers supply product in fresh, frozen and dried forms.\textsuperscript{120}

Unlike the major Australian bushfoods, muntries occur naturally in Victoria. Consequently the soils and climate of Victoria suit their cultivation. The plant takes two to three years to reach maturity.\textsuperscript{121}

In recent years this natural advantage has been enhanced by a number of techniques. Large-fruiting forms have been selected and propagated from cuttings, with upright forms also sought to permit easier harvesting of the fruit. Grafting onto rootstock of other species of kunzea that are known to grow on heavier soils has also been tested.\textsuperscript{122}

There is, however, comparatively little interest currently shown in this product by mainstream manufacturers.\textsuperscript{123}

**Mountain Pepper**

The leaves of the mountain pepper (\textit{Tasmannia lanceolata}) have a very intense, spicy flavour and can be used as a herb in a variety of products. The berries also have a strong flavour and, if dried, can be used in pepper grinders. The leaves also have essential-oil properties.\textsuperscript{124}

The mountain pepper occurs naturally in Victoria, as well as in Tasmania and New South Wales. Until recently most of the material harvested was obtained from wild sources. Cultivation enables growers to be less reliant on the vagaries of the wild resource, and better able to provide regular and quality product to restaurants, manufacturers and other markets.

Cultivation occurs in the Gippsland area, including at Tarnuk Bushfoods, a property visited by the Committee, and in the north-east of the State in localities such as Mansfield.

**Warrigal Greens**

Warrigal greens (\textit{Tetragonia tetragonioides}) is also known as New Zealand spinach. The development of a bushfood product based on its leaf has led to the promotion of the name Warrigal greens. The leaf is the product sold fresh. It is primarily used as a salad vegetable.
Like the mountain pepper, Warrigal greens occurs naturally in Victoria. Consequently the soils and climate of Victoria suit its cultivation. Cultivated plants produce a yield equivalent to that of the mature wild plant when a year old.

The leaf has a high oxalate content which, if consumed in large quantities, can be toxic. It requires removal by blanching in boiling water before the leaf is suitable for human consumption, although recent research has shown that lower levels occur in older plants. Warrigal greens are also suited to being grown using hydroponic techniques.\textsuperscript{125}

Mainstream manufacturers have shown little interest in this product to date.\textsuperscript{126}

**HONEY PRODUCTION**

Honey production in Victoria, and thus the Victorian apiculture (beekeeping) industry, is largely reliant on access to native flora by honey bees (\textit{Apis mellifera}). Honey bees were first successfully introduced into Australia in 1822 - to create a food source, food sweetener and also to pollinate introduced crops. Australian flora were found to produce good quantities of nectar.\textsuperscript{127}

The industry now occurs in all States of Australia, with at least 32,675 tonnes of honey produced per year. Victoria produces 15.6 per cent of the total (New South Wales produces 44.8 per cent) - with a farm-gate value of $50 million (1996 figures). Export markets are important, with some 25 to 30 per cent of honey production exported.

Other products of the industry include beeswax (545 tonnes per year, with farm-gate value of $3.3 million) and sale of queen bees and ‘package bees’ ($3.75 million).\textsuperscript{128, 129} The gross value to Victoria of honey and beeswax products in 1996-97 was $7.9 million.\textsuperscript{130}

The apiculture industry also provides pollination services to agriculturalists. While traditionally viewed as a (freely provided) by-product of honey production, such services are increasingly being provided on a contractual basis; 12,000 hives are contracted to service the almond industry in north-west Victoria each year. The Victorian Apiarists’ Association outlined the importance of spring and summer pollination services:

- Crops for which honey bee pollination is essential are apples and pears, cherries, berries, nashi, kiwi fruit and vegetables; and broadacre crops of buckwheat and lucerne. Crops whose yield quality is improved by the presence of managed honeybees are clovers, sunflowers, canola, faba beans, stone fruits, vegetable seed production and chick peas.\textsuperscript{131}

The ‘value to society’ of pollination services probably outstrips that of honey - the estimated annual value of domestic pollination is around $1 billion.\textsuperscript{132}
Bees need access to nectar and pollen to survive and thrive. Though the honey bee is an exotic species, apiarists depend on native trees and shrubs for a continuity of supply of nectar and pollen. A key study by the Honey Research Council in 1989 showed that the required floral resource was provided by:

- Eucalypt forests and woodlands - 77 per cent;
- Banksia scrubland and coastal heathland - 7 per cent;
- weed species - 10 per cent;
- crops (for example oilseeds and clovers) - 5 per cent; and
- roadside vegetation - 1 per cent.

Particular species are sought by apiarists, as they produce honey with desirable characteristics. Box-ironbark forests of central Victoria are especially valued, as many of their native-tree species consistently produce large quantities of premium quality honey. Yellow box (Eucalyptus melliodora) is considered the premium species. Mallee communities are also important during certain periods of the year, when nectar and pollen are otherwise limiting - notably late autumn and winter. Access to native vegetation at these times is most important for sustained production. In addition to eucalypt species, over 90 species of plants found in Victoria (not all of which are native) produce honey accessible to honey bees.

By 1996-97 there were approximately 1,600 registered operators. Many of these were part-time producers with 50 hives or less. Registered operators had around 100,000 hives. The Victorian Apiarists’ Association estimates that 400 (of the current 1,778) beekeepers own 200 or more hives and produce a substantial amount of their income from honey and beeswax production derived from bee hives. They estimate that 80 to 85 per cent of production is from native flora.

Most of the larger operators are based in and around central Victoria, although their hives may be distributed around the State according to the season and site availability. A commercial apiarist may use over 20 sites a year around the State, although not necessarily the same 20 sites each year. A large part of this network of sites will be on, or abutting, public lands.

A large number of different species of native bee also use the nectar and pollen of the native plants of public lands. None are used for commercial production of honey, but emerging research by the Australian Native Bee Research Centre indicates that native beekeeping “shows exciting potential for gourmet honey production and crop pollination.” The Committee also notes that native bees are stingless.

**Strengths of the Sector**

The apiculture industry is growing - since the early 1960s production of honey has gone from 2,200 tonnes to 4,000 tonnes per year, the number of bee-hives has grown from 62,000 to 109,000 and the number of beekeepers risen from 1,280 to 1,778. This
increase is a result of improved skills and knowledge. The industry provides a vital and increasingly acknowledged role in pollinating a variety of commercial crops. It provides an important supplementary income to many rural Victorians and has developed successful overseas markets.

Challenges Facing the Sector

Beekeeping is a unique industry. Generally neither the basic resources it depends on (that is nectar and pollen) nor the land from which it operates are owned by the beekeeper.

The honey bee uses a very wide range of plant species - up to 50 per cent of all plants in some habitats may be visited. Such native plants are normally pollinated by wind, birds, insects or mammals, with their nectar and pollen used by many insects and vertebrates. It would be surprising if an introduced species did not have some impact on the natural flora it uses, as well as on other native species dependent on this resource - for instance on native bees and birds, due to food and nesting-site competition and changes to pollination. Nonetheless, results of research have been inconclusive. Some impacts have been observed when floral resources are limiting. However, feral populations are numerous and widespread (they have been recorded since the 1860s). Honey bees may provide a substitute pollinator in degraded remnant bushland where natural pollinators are in low numbers.

Resource security is another key challenge facing the industry. Apiculture is dependent on the native forests, mostly now found only on public lands, and there can be conflicts with other uses and activities on these public lands, particularly in areas such as national parks. There is growing concern among conservationists, ecologists and land managers that the presence of honey bees conflicts with the primary purpose of conservation reserves, which is to protect indigenous flora and fauna.

KELP

Kelp is a generic name for macro algae, in particular brown algae. The term seaweed is also used to describe these marine plants. (They are not related to seagrasses, which are a flowering plant, not an alga.)

Kelp is used for four main commercial applications:

a) human food - as a fresh or cooked vegetable;

b) in food and cosmetic manufacturing - colloids used as thickeners and emulsifiers;

c) agriculture - fertilisers and growth promoters; and

d) biomedicines - pharmaceuticals used for health care and cosmetics.

It has been estimated that the world seaweed industry is worth around A$1.5 billion a year derived from production of over 6 million tonnes. By weight, around two-thirds
is used for food, with the remainder used for industrial purposes. In 1995 the market demand for seaweed as food in Japan (a major market) was 220,000 tonnes, whereas production is now less than 100,000 tonnes, the shortfall currently being supplied by China.  

Australia is a net importer of seaweed products - to the tune of over $16 million in 1995-96. Of this, over $3.5 million's worth, or 250 tonnes of seaweed, was for food - an increase of over 200 per cent over the previous two years. Over $12.7 million worth of industrial colloids were imported, including about $2.5 million's worth used in food manufacture. It is somewhat ironic that Australia's major export of kelp (from King Island) is exported to Scotland, where it is used to manufacture alginate - a product that we, in turn, import!

According to Dr Anthony Chisholm of the University of Adelaide, with whom the Committee spent some time on its study tour to South Australia, there are over 1,500 species of kelp found in Australia, of which only one, the bull kelp (Phaeophyta spp.), is used commercially. As an indication of the potential resource, Dr Chisholm pointed out that Japan has about the same total number of kelps but commercially utilises about 10 per cent of its species. Indeed many of the species found in Australia are also found in other countries where they are used as a commercial resource.

Southern Australia is one of the richest areas in the world for large algae. It provides the conditions required for their growth - abundant nutrients and clean, cool water.

The Australian seaweed industry is relatively small, with less than 50 people employed in the industry Australia wide. Beach-cast material is collected in South Australia and on King Island (Tasmania). In South Australia the harvesting involves one operator/processor, who harvested storm-cast bull kelp near the Victorian border. The King Island industry is larger and has proved sustainable over its 20-year life, with a stable amount of material harvested (averaging 25,000 to 28,000 wet tonnes per year). Live kelp was harvested on the Tasmanian coast in the past, but the amount harvested proved unsustainable.

While there is some harvesting occurring in Victoria, it is very minor and not encouraged by the responsible agency, Department of Natural Resources and Environment. One processor of kelp currently operates in Victoria – Sea Organics Manufacturing Australia, based in the Daylesford area. It is understood that most of the raw product processed is now obtained from South Australia. A Victorian company called Australian Sea Vegetables is involved in the food sector of the industry and another, Consolidated Chemicals, is involved in the manufacture of seaweed-derived colloids.
Kelp for Human Food

Kelp is an important part of the diet in several Asian countries. The main countries where it is eaten are Japan, Korea and China and in those countries the average yearly consumption per person is more than 1 kilogram per year.\textsuperscript{154}

There are three broad types of kelp, all of which are used for food products - green algae or Chlorophyta, red algae or Rhodophyta (used in sushi foods) and brown algae or Phaeophyta (used in soups as well as health food capsules and tablets). Seaweeds contain a high percentage of roughage (comparable to celery and lettuce), are high in dietary fibre and vitamins, minerals and trace elements. A Tasmanian company, Tasmanian Wakame, harvests Undaria pinnatifida and is active in the use of seaweed in breads, soups and salads. Seaweeds are also a useful source of protein, with some species having higher levels than many legumes such as chickpea and soybean.\textsuperscript{155}

Manufacturing and Industrial Uses

Seaweed colloid manufacturing is concentrated in a small number of Western countries (Denmark, Norway, France, Spain, United Kingdom, Japan and USA). The manufacturing process extracts three main chemicals:

a) agar - whose ability to form gels at very low concentrations makes it valuable as a stabiliser in a wide variety of foods (such as pastries, confectionery and icecream);

b) carageenan - used to stabilise water/fat emulsions (used extensively in milk-based products and toothpaste, paints, inks and cosmetics); and

c) alginates - whose water-retention, gelling, emulsifying and stabilising properties are used by the textile and food industries; they are the most widely used seaweed colloid.\textsuperscript{156}

Agar and carageenan are manufactured from red alga, whereas alginates are derived from brown alga.

Agar-producing kelp is not harvested in Australia at present, but suitable species grow in south-eastern waters.\textsuperscript{157} Bull kelp harvested in Tasmania, and found in Victorian waters, is used for alginate manufacture.

Sector Strengths

Victoria has a wealth of kelps with both potential and proven commercial use. Australia is a net importer of seaweed products, including fresh and dried product. The potential for substitution of Australian for imported seaweeds is high (but dependent on quality, price and presentation of local species).\textsuperscript{158} There is rising interest in health foods and increasing popularity of Asian cuisine in many countries,\textsuperscript{159} and Australian seaweeds have very low levels of heavy metals compared with those of overseas suppliers - an issue of increasing international concern.
Kelp cultivation could well be combined with other forms of mariculture. There is a wealth of international research literature on the marketing and production of seaweed products and much of this would be relevant to the Australian context.

**Sector Challenges**

The key challenge is to further develop the business case for taking up the apparent opportunities and thus attract interest and investment into the sector.

Timing and location of harvest, as well as harvesting procedures, all affect the quality of the product. A number of environmental impacts may arise from beach-cast harvesting:

a) beach erosion;
b) vehicular damage to coastal ecosystems;
c) depletion of near-shore marine environment; and
d) loss of micro-habitats within cast material for animals which use these habitats.\(^{160}\)

Growth of seagrass and kelp is most abundant where marine up-welling provides a large input of nutrients to the waters near the coast. In this situation removal of some of the nutrients through harvesting is unlikely to cause undue depletion of the marine environment, especially if the volumes taken were controlled and methods used avoided damage to the beach and dunes. South Australia has regulations for beach-cast harvesting that aim to minimise adverse impacts, and research in Canada and Ireland has shown that harvesting can be carried out in a sustainable manner.

Kelps can be cultivated commercially and cultivation may be better than wild-harvesting to produce edible kelps.\(^{161}\) It would allow environmental risks to be reduced and control over the quantity and quality of the product.\(^{162}\)

**ESSENTIAL OILS**

Essential oils are a type of oil obtained from plants that evaporates readily when distilled or otherwise extracted. They are found in the leaves, stems, roots, flowers or seeds of over 1,500 species of plant. They generally consist of a complex mixture of compounds, with around 150 to 200 essential oils commonly traded around the world. Major producers are USA, Europe and, to an increasing extent in recent decades, China, Brazil, India, Egypt and South-east Asia.\(^{163}\)

Essential oils are used:

a) for flavouring, for instance in confectionery, beverages and processed goods;
b) as fragrances in, for instance, oral and bodycare products and perfumes;
c) in therapeutic applications, as pharmaceuticals, in health care and, more recently, aromatherapy; and
d) as insect repellents \(^{164}\)
In Australia (1995 figures), the essential oils industry is based on 12 commercial crops being grown by approximately 150 growers, with a wholesale value of the processed product about $6 million. Traditionally the Australian essential oil industry comprised eucalyptus and tea tree oil production. Essential oils are now also derived from an array of introduced species such as fennel, lavender, peppermint and spearmint.

There is a small industry in Victoria based on the production of essential oils. Some are produced in other States, but distributed in Victoria. Oils are produced from a variety of plants, supplying niche aromatherapy and naturopathy markets. The main species grown, Melaleuca alternifolia, does not occur naturally in Victoria and is not currently grown in the State. The main essential oil produced in Victoria is eucalyptus oil.

**Tea Tree Oil**

Tea tree oil is now considered a mainstream agricultural product, with Australia the major producer in the world. More than 80 per cent of the Australian crop is exported. The oil is extracted by steam distillation and its antiseptic and antifungal properties have led to its use for health-care and cosmetic applications. Several species are used, but the major productive species is Melaleuca alternifolia. The industry originally was based on natural stands of plants, but plantations were established in the 1980s when demand exceeded bush production capacity - production from bush stands was about 12 tonnes per year, with plantation-based production increasing this to around 200 tonnes in 1996-97. Plantation-based production has created other issues to be dealt with, such as agronomy and weed and insect control.

Overseas production of tea tree oil is currently low, but in recent years plantings have been established in China, Fiji, India, Indonesia, New Zealand, Thailand, USA, Vietnam and Zimbabwe. Potential competitive effects on oil prices are considered a significant threat to the Australian industry. Recent Australian research has shown, however, that very large gains in oil yield can be had simply by obtaining seed from selected natural populations and developing seed orchards to promote their use.

**Eucalyptus Oil**

Eucalyptus oil is used for industrial and medicinal purposes around the world - for food flavouring, in confectionery, detergent, aerosol, soap, chest rub, nasal and cough drops, inhalant, hand cleaner, perfume and as a solvent. The oil is extracted by steam distillation and either marketed as pure oil sold direct to the consumer (about one-third of total oil production, mostly in Australia and Asia), or used as a component of other products (with the largest markets being in Europe and North America). The crude oil generated by the grower is generally sold to an oil refiner for distilling and distribution.
The industry started in eastern Victoria in 1852, using leaves from native eucalypt stands. Export commenced in 1865. Until the 1950s Australia was the largest world supplier, producing approximately 1,000 tonnes and supplying 70 per cent of the world’s market in 1976-77. Overseas competition and low, fluctuating world prices have since eroded this position. Other major producers are China, Spain, Portugal, South Africa and Chile. 173

Worldwide, the production of eucalyptus oil is now about 3,000 tonnes a year. The Committee was surprised to discover that, while eucalypts are indigenous to Australia, more than half of the world production of eucalyptus oil comes from China. 174 Indeed Australian production is currently only about 120 tonnes. 175

The raw material to produce trees is available, the soils and climate are suitable, the oil is easily produced, there are currently stable world demand and prices, and Australia has a history of production and trade extending over 140 years. 176

Yet the farmgate value of eucalyptus oil (in 1991) was less than $1.5 million, and little value adding is done in Australia. The retail value of the Australian crop, if simply sold in small bottles, would exceed $5 million. 177

The main Australian trade is now in import and export (with Australian oils mixed with lower-quality imports to upgrade them for export). The blue mallee (Eucalyptus polybractea) is the main commercial species produced in Australia (it yields a high cineole oil used for medicinal uses), although a range of species have been used in the past (according to end-use demand for their different oil compositions). 178 Blue gum (Eucalyptus globulus) is the main species used overseas, a factor of oil production often being a by-product of plantation wood lots of this species.

**Victorian Industry**

Victoria and New South Wales are the main production areas in Australia. Oil-producing species found in Victoria include:

a) broad-leaf peppermint (Eucalyptus dives) - widespread in areas of medium-rainfall southern temperate Australia, in low, open forests and woodlands; produces high-grade oil;

b) narrow-leaf peppermint (Eucalyptus radiata) - similar distribution to broad-leaf peppermint; also grown in African countries;

c) blue mallee (Eucalyptus polybractea) - grows in flatter Mallee sites; produces high-quality, cineole-type oil; not readily grown in competitor countries; and

d) blue gum (Eucalyptus globulus) - widespread in higher-rainfall temperate south-east Australia; one of the main species grown overseas; can provide wood and pulp as well; oil is not high grade. 179

Victorian production is centred in the box-ironbark forests and woodlands of central Victoria, utilising blue mallee (Eucalyptus polybractea) as well as green mallee (Eucalyptus
viridis) and some bull mallee (Eucalyptus behriana). These have a mallee form, that is they are multi-stemmed. The branches are mechanically cut close to the ground, with the oil then extracted by forcing steam through the leaf, and then separated by skimming off from the resultant mixture. A by-product is leaf residue that is sold for garden mulch.\textsuperscript{180}

A total of 2,950 hectares of public land is currently used for harvesting, of which, given a two-to-four-year cutting cycle, about 1,000 hectares is harvested each year. Over 2,000 hectares of this area are located in the Inglewood/Wedderburn area. Other areas used are at Bendigo, St Arnaud and Rushworth. Oil production from these areas in 1995-96 was 20,915 kilograms.\textsuperscript{181}

In recent years, several small eucalyptus oil enterprises in north-central Victoria have expanded operation and the construction of a modern distillery at Bendigo has been mooted.\textsuperscript{182} There are three main distillers operating in Victoria, all in the Inglewood district (others exist but have found it uneconomic to operate). The Committee had the opportunity to visit the largest of these, the Kingower Distillery, as well as a smaller tourist-orientated operation at Wedderburn.

**Industry Strengths**
Advantages of the Australian industry are seen to be:
- a) the diversity of species producing high quality oil (and untapped genetic resources);
- b) a sound technological base; and
- c) an international reputation for high-quality oil.\textsuperscript{183}

Technical advance has been slow, but mechanical harvesting technologies have been introduced and portable distillation plants developed.\textsuperscript{184} Current research and development involving breeding and vegetative propagation of high-yielding trees has brought oil yields up to 5 per cent, a doubling of past yields.\textsuperscript{185}

In recent years, however, many hectares of oil-producing mallee eucalypts have been planted in Western Australia and this may undermine the potential of a plantation-based industry in Victoria.\textsuperscript{186} When in Adelaide, the Committee spoke to researchers with the South Australian Department of Primary Industries and Resources\textsuperscript{187} and learnt of their research into distillation methods which, when combined with improved cultivars and harvesting methods, are envisaged to reduce the cost of producing eucalyptus oil in Australia significantly.

**Industry Challenges and Opportunities**
Factors which may be limiting Australia’s industry are:
- a) lack of coordination and cooperation within the Australian industry;
- b) higher labour costs than overseas competitors;
- c) a long period with little research and development;
d) low and uncertain prices;

e) failure, or lack of potential, to use other parts of the plant for wood and fibre; and

f) regulatory requirements for health and medical use.\(^{188}\)

There are now virtually no remaining areas of natural bush suitable for modern production methods - straight-row plantations assist mechanical harvesting and pest and weed control. The reluctance of public land managers to permit major modification of the native stands, as well as relatively high labour costs of using unmodified natural stands, have led to the industry increasing plantation production and technology.\(^{189}\)

Some believe that the sector is likely to remain marginal:

> At this stage of the industry's development it is not feasible to set up a viable operation if land and all equipment has to be purchased. ... The key to success is the market price. If it remains at its present level it will be impossible to produce oil in Australia at competitive prices.\(^{190}\)

However:

> If land and some standard items of agricultural equipment are already owned, and the cost of establishment of trees is covered by some other project, eg trees planted for desalination, a profitable operation might eventually be possible.\(^{191}\)

Others have a contrary view, with researchers in South Australia actively pursuing strategies of improving distillation methods, cultivars and harvesting methods.

According to the output of an essential oils industry planning workshop, the future of the Australian industry will depend on:

- maximising oil yield per dollar input by, for example, introducing high quality and high yielding lines, and by improving the demand for ... oil through a combination of well targeted marketing strategies and by meeting or modifying overseas requirements for registration as an over-the-counter medicine.\(^{192}\)

**Other Australian Essential Oils**

Australia is the dominant producer of Boronia oil - obtained from the brown boronia (Boronia megastigma). The industry was originally based on wild pick in Western Australia, but now is mostly plantation-based in Tasmania and produced in a vertically integrated operation. Farm-gate price is around $2,500 per kilogram (1995).\(^{193}\)

While $2,500 per kilogram is a significantly higher return than the farm-gate price of eucalyptus oil (at $7 per kilogram), the world market for boronia oil is very small and the cost of production very high.
The mountain pepper (*Tasmannia lanceolata*) is also being considered for essential oil production. Its main use to date is as chewing gum in Japan. As a bushfood plant, and one found and grown in Victoria, synergies of production are possible. Lack of registration as a foodstuff is the major current constraint to its further development.  

**INDUSTRIAL CHEMICALS, COSMETICS AND PHARMACEUTICALS**

As previously described, a number of native bushfoods, Victorian kelps, and plants used for essential oil production are also used or have potential for use in industrial, cosmetic and pharmaceutical applications.

Other species include:

a) *Backhousia* spp. - now being tested for plantation production;  
b) common sneezeweed or ‘old man weed’ (*Centipeda cunninghamii*), widespread in Victoria and is a potential medicine;  
c) *Duboisia* spp. - used as a source of alkaloid extracts;  
d) black wattle (*Acacia mearnsii*), widespread in Victoria and used elsewhere to produce high-quality tannin extracts; and  
e) two species identified as containing chemicals with anti-viral activity - *Dianella longifolia* (flax lily) and *Pterocaulon sphædatum* (a daisy)

The anti-viral properties of the last two named species were identified as a result of screening of plants known to be used by Aboriginal people for medicinal purposes.  

Traditional Aboriginal culture used a multitude of herbal medicines, of which some knowledge survives. Dr Beth Gott records a dozen different plant groupings found in Victoria that are known for their medicinal use. In the early 1840s barilla, a plant ash rich in sodium and potassium, was produced on French Island (it had previously been produced in New South Wales). It was produced by cutting mangroves, dragging them above the high-water mark, burning stockpiles of stems and then bagging the resultant ash for sale. Some 30,000 kilograms of barilla was produced but the operation could not compete with chemically produced sodium and potassium.

The development of pharmaceutical drugs is a highly competitive sector that requires a huge investment ($400-$500 million) and about 10 years of research and development to develop a new drug (but it can be very lucrative). Many pharmaceutical drugs are derived from natural products, including 10 of the top 25 drugs currently in use.

Systematic screening of the Australian flora for constituents useful for medicinal drugs was initiated in the early 1940s by the CSIRO and continued up until the mid-1970s, when it was scaled down. The CSIRO and its collaborators screened many thousands of plants, particularly for alkaloids but also for stock poisons and anti-tumour constituents. A number of potential anti-cancer agents were identified during this program. Screening of plants (a process known as ‘bioprospecting’) continues,
within Victoria notably by AMRAD Discovery Technologies Pty Ltd (established in 1993). It is one of only two companies undertaking this work in Australia (the other is in Queensland). However, two factors that discourage research into medical applications of native-plant extracts were identified by the CSIRO. One is the technical—screening tests have not always identified the activity of plant extracts that more elaborate (and costly) tests have shown to have anti-tumour or other medical benefits. The second factor was “the realisation that commercial benefits of [CSIRO’s] collaborative screening activity were unlikely to be retained in Australia under the conditions then pertaining”.

The Committee inspected AMRAD’s Burnley laboratories and spoke to key staff. The company collects plants, fungi and micro-organisms from around Australia and South-East Asia and screens them for compounds for use in pharmaceuticals. Trained botanists are contracted to collect specimens, targeting species not previously sampled. Endangered species and ethnobotanical knowledge are not targeted. The company has a very high-tech and impressive operation and conducts millions of assays each year, utilising a highly sophisticated system incorporating robotics and bar-coded tracking. The company operates through licensing arrangements, working in collaboration with large overseas companies - it provides raw material for a fee and then gains royalties through intellectual property rights if products are successfully developed.

In addition to conventional pharmaceutical uses, the growing popularity of herbal medicines could lead to an increasing demand for treatments based on traditional uses of native plants. In the United States increasing demand has been reported as sufficient to pose a threat to natural ecosystems.

**Duboisia**

Duboisia is one of the few native Australian plants that has obtained mainstream agricultural product status. The export-oriented industry is based principally on the corkwood (*Duboisia myoporoides*). The primary product of the plant is alkaloid extracts, which are used for a number of medical purposes, including as a muscle relaxant and as a depressant. The gross value to Australia of the industry in 1991-92 was $3,755,000.

The plant occurs naturally in New South Wales and Queensland, with current production from plants grown in southern Queensland. (Plants are also grown in India and Pakistan.) It has an interesting history of development - its medicinal properties were first recorded by a Brisbane physician in the 1880s, with production of hyoscine (the isolated alkaloid) commencing in 1940 - to meet war-time requirements. Further research into related species in the 1950s led to the high-yielding strains that provide the basis of the current Queensland plantations. The key trade product was patented by a major overseas drug company (Boehringer Ingelheim), in the 1950s.
This led to a loss of control of value-added potential but ensured a stable market for the Australian-grown leaf. The extracted alkaloids are estimated to be worth $10-30 million and the formulated product $100-$300 million.\textsuperscript{200}

**Black Wattle**

Black wattle (\textit{Acacia mearnsii}) is considered “one of the world’s highest yielding sources of condensed tannins”.\textsuperscript{209} The wattle extract is primarily used as a tanning agent in leather manufacture. Indeed it is “recognised worldwide as a tannin extract of superior quality which has an important role in global markets”.\textsuperscript{210} Tannin extract is a concentrate produced through a process of shredding and leaching the bark.

The wattle tannin extract has an array of other current and potential uses. The tannins obtained from the bark are water-soluble phenolic compounds and such compounds have traditionally been used (and continue to be used) for converting animal skins into leather - hence the name tannin.\textsuperscript{211} But they are also used for an array of other uses including wood bonding adhesives (a use developed in the 1940s by CSIRO),\textsuperscript{212} as a treatment for preventing the corrosion of metals\textsuperscript{213} and as a conditioning agent for drilling muds.

Black wattle is endemic to south-eastern Australia and is found throughout Victoria in a range of elevations and soils. Its distribution has been significantly reduced since European settlement, primarily because the once-extensive stands were stripped of bark and were not replaced. Tanning was one of Australia’s first manufacturing industries, but there was indiscriminate harvesting - with a Board of Inquiry appointed in Victoria in 1878. Plantations were established (including at the You Yangs in 1887), but these were unsuccessful for a range of reasons, with the result that the supply of mature trees for bark became unavailable. Since the turn of the century tannin has been sought from overseas supplies - from black wattle plantations established in South Africa and other species from South America.\textsuperscript{214}

Black wattle is still grown in plantations in South Africa (the largest supplier), as well as Zimbabwe, Kenya, Tanzania, Brazil and, since the 1950s, in China (assisted by CSIRO scientists). Black wattle tannin extract currently used in Australia for commercial applications is imported from overseas.

Black wattles are also used for minor timber products - firewood and craftwork, and for conservation works - growing readily on disturbed sites.

**Sector Strengths and Challenges**

Victoria has a diversity of plant species that provide a large resource of chemicals to be explored for useful chemicals.\textsuperscript{215} Current research is developing an inventory of chemicals in these plants and investigating the potential (particularly for pharmaceutical use) of many of these chemicals.
Challenges facing these sectors include that:

a) much of the relevant research is focussed on individual chemicals in isolation while the value of a plant extract may depend on the combination of chemicals which occur together naturally in the plant; only limited research is being done on the biological activity of total plant extracts; and

b) there appears to be difficulty in retaining commercial benefits of pharmaceutical research within Australia; and

c) where native species are lost (for instance, as a result of changes to land use and competition from weeds) potentially useful chemicals and combinations of chemicals in them may also be lost.

Wild harvesting of plants for herbal treatments could exacerbate this problem.

**BUILDING MATERIAL AND FIBRE**

**Broombush**

The cutting of broombush, for roofing and other domestic uses, has occurred at least since the first Europeans settled in the Mallee. Commercial-scale harvesting to create fencing material commenced in South Australia in the late 1930s, with brush harvesting for fencing introduced into other parts of Australia more recently, including Victoria in the mid 1970s.

Brush fences are very price competitive with other fencing materials and are often sought after for situations where a noise baffle is required or an aesthetic landscaping feature desired. Brush is also used to create shade houses, hanging baskets and other products.

The brush is produced from the native broombush or broom honey-myrtle (*Melaleuca uncinata*). Broombush occurs throughout Australia in a variety of climates on a variety of soils. Within Victoria it is found in the Mallee on sands and sandy loams, often in dense stands. Younger plants often have multiple stems, with older plants tending to have fewer stems. They may reach up to 5 metres in height.

Harvesting involves cutting the stems of the plant near its base. The stems are then placed in bundles and sold to processors who manufacture fencing panels for resale or, more commonly, direct to fencing contractors. Victorian cutters target plants of age 15 to 30 years; the plants regrow after harvesting. About two to three bundles (each weighing 23 kilograms) are required to build one metre of fence. Currently around 100,000 bundles of brush are cut each year and sold for brush fencing in Adelaide.
**Victorian Industry**

Public land in the Big and Little Desert regions of the Mallee were the main source of brush in Victoria.\(^{223}\) Sources of naturally occurring material on private land are very limited due to clearing for agriculture.

In the 1980s a reduction in the South Australian supply of brush and an increase in demand for Melbourne fencing led to an increasing number of applications for broombush harvesting licences in Victoria. Subsequently more operators were licensed and larger amounts of broombush were being harvested in Victoria. A processing plant that manufactured fencing panels operated from Murtoa.

After considering the potential environmental impacts of harvesting and the nature conservation values of the areas concerned, the then Land Conservation Council recommended, in 1989, that substantial areas of the Mallee be included in national parks. As a result, the then government paid out the current operators by buying back their harvesting licences.

While broombush harvesting is still permitted outside the national parks, little, if any, is now undertaken in Victoria.

**Current Trends**

Supplies in Queensland were exhausted by the late 1980s, although at this time brush was still being cut in western New South Wales and Western Australia.\(^{224}\) In South Australia the availability of naturally occurring broombush is now also declining. Harvesting is considered a form of clearing under State vegetation clearing laws and permits are required. Fencing contractors, at times, have difficulty in obtaining sufficient brush to meet demand.\(^{225}\)

Interest is developing in the cultivation of broombush.\(^{226}\) A number of trial plantings have been established in South Australia and Victoria. Research has been undertaken on yields under irrigation and under various planting densities, and for different fertiliser, weeding and harvesting regimes. These trials have demonstrated that it is possible to cultivate the plant. Harvesting regimes as low as every five years are feasible.\(^{227}\)

The Committee inspected a small plantation of broombush at Stawell.\(^{228}\) The plantation, of about 1,000 irrigated plants, was two years old. It was expected to produce a commercial harvest in two to three years time. Other plantations are in Walpeup and Gippsland, the latter supplying material to the Melbourne market.

The planting of broombush has other potential benefits to landholders:

a) shelter - when used as part of shelter belts;

b) salinity control - the root systems of older plants will reduce groundwater recharge;
c) erosion control - it will grow on sandy soils;
d) land reclamation - it can grow in areas subject to salinity and water erosion; and
e) wildlife habitat.\textsuperscript{229}

\textbf{Sector Strengths and Challenges}

Broombush harvesting enjoys a stable market for its product, a market that appears to be resource limited. As naturally occurring plants, especially those suitable for cutting, are now limited in availability, cultivation is increasingly attractive. Cultivation of broombush is feasible and, subject to the specific cost of establishment, yield generated and market price, has commercial potential.

It offers an economic use of otherwise unproductive land, and will grow without irrigation or application of fertiliser, albeit with lower yields. Greening Australia believes that:

There is an enormous potential for the incorporation of broombush production into the traditional Mallee and Wimmera annual cropping systems ... including the growing of broombush in ‘alley farming’ layouts [that is, regular rows of shelter belts] ... Broombush is especially attractive when compared with timber crops because of the relatively short rotations (8 to 15 years).\textsuperscript{230}

\textbf{Seagrass}

Seagrass is used as garden and horticultural mulch. It has also been used as an insulation material in the building industry.

There are a number of operators in Australia. There is little occurring in Victoria,\textsuperscript{231} less than six operators in South Australia and approximately 80 in Tasmania.\textsuperscript{232} All material harvested in South Australia and Victoria is beach cast, whereas harvesting of both beach-cast and detached floating material is permitted in Tasmania. No harvesting of attached (that is, live) material is currently permitted in Australia.

\textbf{Sector Strengths and Challenges}

Seagrass is a comparatively bulky and low-value product, with an array of alternative sources of mulch available.

Large-scale harvesting of seagrass is not encouraged in Victoria by the responsible agency, as “little is known regarding the extent of this resource, and recognising its broad habitat value, the Department of Natural Resources and Environment is taking a precautionary approach to management”.\textsuperscript{233} Vehicle access on beaches, a necessary part of the harvesting operation, is very restricted in Victoria, principally due to potential dune erosion and recreational user impacts. Removal of beach-cast seagrass can also have an impact on other in-situ values of the material - habitat value (including for nesting of some bird species) and value as a dissipater of wave energy and thus beach erosion.
AGRICULTURAL USE

Use of Native Plants for Bush Grazing

Throughout Australia's semi-arid rangelands, the pastoral industry is largely dependent on stock having access to indigenous flora for food - principally in the form of native grasses and herbs. Such grazing is usually carried out on Crown lands over which people have been granted non-exclusive licences for pastoral use.

The situation is very much different in Victoria. While stock feed in the form of native grasses was largely responsible for the European settlement of the State, this is no longer the case. The great majority of the agriculturally productive lands of the State were sold and, as the native grasses were eaten out, modified by the introduction of alien grass and clover species and subject to fertiliser regimes, clearing of overstorey vegetation and, in places, irrigation. Thus the role of native plants for pasture is now very much reduced. There is no 'rangeland' country in Victoria, and currently limited grazing on public lands.

The majority of remnant native vegetation in Victoria is on public lands. While much of this has been subject to grazing to at least some extent in the past, extensive areas of such remnant vegetation are now included in national parks and other nature conservation reserves, with grazing excluded on the basis of incompatibility with the management objectives of such land uses. Two notable exceptions are grazing in alpine areas and along river frontages.

Native grasses and herbs of the Victorian alpine area are very palatable to cattle (and sheep - although these have long been prohibited on soil-conservation grounds). The vegetation of these alpine meadows and the understorey of surrounding forests are used for grazing for periods of up to 12 weeks each year, in summer and early autumn. Outside this period the cattle are moved to lower country to be fattened up and sold. The licensed grazing blocks are used to supplement the capacity of the private lands used by licence holders - while important to individual operators their economic importance is minimal on a State scale.

Native vegetation also remains on much of the public land abutting most of the State's watercourses, land originally excluded from sale to ensure free public access to water. This vegetation is grazed under the authority of river-frontage licences, originally issued to help adjoining landowners avoid the costs of fencing - a reason still important for most licence holders. All such grazing is subject to defined stocking rates and compliance with certain conditions.

While native plants are thus of limited economic importance for pastoral use in Victoria, there are, however, some areas where native grasses are now being shown to have advantages over exotic species pasture. The advantages arise from both grazing production and from the point of view of soil conservation. Lands with
approximately 350-600 millimetres yearly rainfall, such as between Echuca and Goulburn, have been shown to be suitable.

A number of native Australian grasses are also being used on salinity-affected land. The primary focus of salinity control in Victoria is to ensure that recharge areas are well covered with perennial vegetation that uses rain as soon as it falls, rather than allowing it to reach the water table. Recharge areas, especially in the north-east of the State, are often rocky and dry. The only exotic grasses that can be established on such sites are usually annuals, which need fertilisers to maintain them. It is difficult and generally uneconomic to establish such grasses. Annuals are also unable to use the first rains of autumn, as they must re-establish each year. However, native perennial grasses, in particular wallaby grass (Danthonia spp.) and weeping grass (Microleana stipoides) are commonly present in these areas. They can be managed or resown as economic and effective alternatives. Being perennial, they are able to use rain as soon as it falls and so reduce recharge.

In discharge areas salt-tolerant native shrubs can be used to lower water tables, provide feed and protect soils. The Committee saw saltbush used in this way in South Australia. As salinity is reduced, perennial native grasses, such as wallaby grass, can be introduced between the shrubs. This provides additional fodder, water use and soil protection.

Native Fodder Crops

The productive value of a number of native shrubs as fodder crops has been rediscovered in recent years. Interest has been renewed in increasing productivity in areas of low rainfall and as drought fodder, as well as for applications such as reduction of water tables, erosion control and to increase productivity of saline soils. Saltbush is the main species being currently targeted - it is deep rooted and has a high drought and salt tolerance. While an array of saltbush species occur in Australia, the most commonly used species is oldman saltbush (Atriplex nummularia).

The Committee visited Western’s Nursery in Renmark. It specialises in the production of saltbush. Ironically, after a number of years of selecting plants best suited for palatability and production, Western’s Nursery found that seed stock obtained from South Africa was the best - it was apparently introduced to South Africa in the late 1800s from Australia. As germination from seed is difficult, the plant is generally sold as seedlings. Western’s Nursery’s success as a major supplier of saltbush was facilitated by their previous nursery experience and parallel development of an efficient mechanical planter.

The Committee also inspected a property that had been using planted saltbush since 1996. The owner found that it can increase the carrying capacity of marginal grazing
land by up to 20 fold. The Committee is also aware that use of saltbush is being trialled in parts of Victoria - around Nhill and Pyramid Hill.

Methods for the best planting strategies and management of grazing are still being developed. Further selection of plants could enhance yields, protein levels, palatability and bushiness. It is also possible to harvest the fodder and pelletise it - plantation production of such pelletised food may be commercially viable. Saltbush is well suited to alley farming systems, which are described elsewhere in this chapter.

Other shrubby species planted as stock food within Victoria include:
   a) golden wreath wattle (Acacia saligna); and
   b) river saltbush (Atriplex amnicola).
These species are palatable, fast growing and, most importantly, recover well from grazing (but require stock exclusion during establishment).

Tangled lignum (Muehlenbeckia cunninghamii) has been used by one Loddon Valley dairy farmer to feed cattle, provide shelter from chilling winds, lower water tables and reverse salinisation of soils.

**Other Potential Crop Species**

Greening Australia drew the Committee’s attention to the potential for crops based on native species:

Victoria has a range of deep rooted perennial native legume species which have considerable potential for selection and development for farming purposes, to possibly assist with dryland salinity control and to provide productive options in areas where introduced legumes will not persist … native grasses also offer some possibilities.

Examples of potential crops are:
   a) purple glycine (Glycine latrobeana), which is related to the introduced soybean (Glycine max) - native glycine species can grow in frosty and low-rainfall areas outside the range of the introduced species and could be used to create productive cultivars;
   b) some of the species of scurf peas (Psoralea) - a deep rooted legume with potential as fodder and ‘pulse’ crops; and
   c) weeping grass (Microlesana stipoides), whose seed is very similar to wild rice grass - it could be grown as a cereal crop in areas unsuited to existing introduced crops and would require lower inputs.
LAND REHABILITATION AND AMENITY

Land Rehabilitation

Current Australian agricultural systems are largely based on those imported from Europe. While these have been developed over thousands of years to suit European soils and climates, the Australian environment is very different. A lack of responsiveness to these differences has led to soil and water degradation.

Land rehabilitation involves reversing soil erosion and salinisation, improving water quality in streams and wetlands and restoring or protecting natural ecosystems. It provides economic benefits in terms of improved agricultural production, reduced land and water degradation and increased land value.248

There is an increasing body of evidence that suggests that “to achieve long term environmental sustainability of farming systems, perennial vegetation (shrubs and trees) must be integrated into the agricultural landscape”.249

A substantial body of research has been undertaken to identify how trees and other woody vegetation can most usefully be used to reverse land degradation, and what species are of most value.250 Local native plants are usually recommended.251

Such plantings for rehabilitation may provide direct returns from products such as timber, firewood, fodder, cut flowers or seed. Increases in landscape and habitat values may be used to advance rural tourism.252

‘Alley farming’ has been shown, by research and practical application, to be a successful method of integrating perennial vegetation into farming systems. The system involves belts of trees and shrubs being planted between crops and grazing land. The plantings provide shelter (from wind and sand blasting) and, if deep-rooted species are used, reduce watertable recharge and help lower the watertable. They also provide habitat for beneficial wildlife (that is, natural predators of pest species). Native shrubs useful for grazing fodder, as well as wood-producing species, have been advocated as suitable for alley farming. If greater than 50 metres wide, planted belts could function as wildlife corridors.253 Other productive crops suitable for alley-farming shelter belts include broombush.254

An officer of Greening Australia emphasised the benefits of using native species and alley farming. He believed that placing 10 per cent of a sheep property under strategically located shelter belts would increase farm production (perhaps by up to 20 per cent), with alley farming in cropping regions reducing erosion and increasing crop production.255

Rehabilitation works are supported by suppliers of plants, seed, information and direct seeding or planting facilities.256
Amenity Planting

A number of native species have long been recognised as having value for amenity plantings in public places - for instance, Cootamundra wattle (Acacia baileyana), lilly-pilly (Acmena smithii), paperbarks (such as Melaleuca stypheliodes), silky oak (Grevillea robusta), the lemon-scented gum (Eucalyptus citriodora) and flowering gums (such as Eucalyptus fidifolia). Usually such species were planted well beyond their natural distribution.

In recent years there is also much wider use of native plants by local government and State government agencies - in median strips, public parks, along freeways and for stream-bank stabilisation.

Greater acceptance by the public of ‘natural looking’ amenity plantings of native grasses and shrubs has led to them replacing green lawns and flowerbeds. For instance hundreds of thousands of native grass plants have been used at Olympic Games venues in Sydney.\(^{257}\)

Three varieties of the native Australian weeping grass, Microlaena stipoides, have been registered under Plant Breeders Rights (in 1995), with research currently being undertaken into their commercialisation - for turf and amenity, as well as forage purposes.\(^{258}\) Microlaena stipoides is a perennial grass native to Victoria and, like other native grass species, offers a key benefit of having high drought tolerance.

Seed Banks

The demand for native seed has increased significantly over recent decades. This increase has been attributed to:

a) changing attitudes in the wider community towards use of native species;
b) greater effort in replanting, for example Landcare programs;
c) legislative requirements for land rehabilitation; and
d) changes in land-management standards. \(^{259}\)

Seed is the major raw material for propagating native plants in Australia. The demand is primarily due to the cost effectiveness of direct seeding practices and mass tube-stock planting.

Seventy per cent of seed collected is used by mining companies in rehabilitation, some 20 per cent is used on private land rehabilitation and Landcare projects, with the rest being used by State and local authorities on roadsides and reserves. Minor use is also made by forestry operations and for bushfoods.\(^{260}\) Seed banks are also used to conserve ex-situ material (germplasm) of rare and threatened flora.

The native seed sector includes those who are involved in the collection, storage or use of native seed. The commercial sector is the major supplier of native seed.
Commercial operators range from small, home-based businesses to major seed merchants whose facilities include seed testing and cleaning laboratories. Seed banks, once the exclusive province of government research, forestry and land-management agencies, are also becoming increasingly commercial. Community seed banks are also developing - largely in response to a demand created by Landcare activities. A feature of the community seed banks is their emphasis on the collection of locally indigenous seed.  

One of the key indigenous species based seed banks in Victoria is the Melbourne Indigenous Seed Bank at Burnley College. This was established in 1991 as a joint initiative of Greening Australia and the Royal Botanic Gardens. The Committee visited this seed bank, which is funded partly by Bushcare, but mostly by fee-for-service activities such as vegetation restoration projects for industry and other agencies. The seed bank collects and stores seed, with a focus on ‘local provenance’, that is collecting at specific localities for revegetation works at the same locality. It currently stores about 3,000 accessions of seed from over 200 sites. In addition, it provides information and sells seeds. An extensive database is maintained; being the core of a Statewide network of about 13 seed banks.

In Victoria most seed is collected from natural bush sources, with demand constant or increasing. The average amount collected per seed collector, as recorded in a 1998 survey of 53 Victorian collectors, was 52.3 kilograms, with each collecting an average of 39 different species.

**Sector Issues**

One of the issues facing the increasing level of seed collection for revegetation is the pressure it may place on remnant vegetation and its seed resource. An officer of Greening Australia noted that:

Birds feed on the seeds, the next generation of plants need seed to regenerate in situ, but if you collect unsustainably you remove that capacity.  

He went on to say:

I am aware that some of the commercial seed companies … do undertake some very irresponsible seed collection. They come in very gung ho and harvest branches and that sort of thing. It’s like cutting down apple trees to get the apples instead of picking them.

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1 The Committee notes that in the flower trade the term ‘Australian wildflowers’ is often taken to include both Australian native plants and South African proteas grown in Australia. For the purposes of this Inquiry, discussion will focus on species native to Australia and/or Victoria, which are grown in Victoria.


6 ibid.
7 Department of Natural Resources and Environment (1999), Flora Information System - as at July 1999.
8 Walsh, N. (1999), Senior Botanist, National Herbarium of Victoria, personal communication, 23 April 1999.
13 In accordance with the Terms of Reference of this Inquiry, use for timber will not be discussed.
14 Excluding forestry.
15 For example, roses, carnations, chrysanthemums, tulips, and lilies - Industry summary: A snapshot of Australian floriculture and exports. Flower Export Council of Australia’s Internet site: http://www.iinet.net.au/~feca/industry.htm
17 Reference to the ‘flower’ or ‘cut flowers’ industry includes foliage and dried flowers.
19 Some estimates put the value of wildflower production in Australia as high as $85 million. The above figures are taken from the most comprehensive review to date of the Australian wildflower industry: *The Australian Wildflower Industry* (2nd edition), conducted for the Rural Industries Research and Development Corporation by Karingal Consultants. The report noted that the available statistical data relating to the Australian floriculture industry is limited in both accuracy and scope.
24 Proteas are native to South Africa.
26 ibid.
30 Being developed by Eucalypt Enterprises, a subsidiary of Florish Marketing.


40 Mr Jim Robinson, Rural Project Officer, Greening Australia, *Minutes of Evidence*, 26 April 1999, p. 17.


42 ibid.


45 ibid.

46 ibid.


48 ibid., p. 7.


53 It commenced operations on 1983, at Ringwood.


56 Note that the Committee’s Discussion Paper, misquoted a secondary source in a manner that implied that the Victorian harvest was entirely illegal - this is not the case.


58 ibid.


61 One of the first recorded European uses of native flora was by Captain Cook, who, in 1770, used an infusion made of the leaves of *Leptospermum scoparium* to make an antiscorbutic drink used to reduce the incidence of scurvy in his crew - hence the term ‘tea tree’. Recorded in Morrison, C. (1961), *Along the Track with Crosbie Morrison*, Whitcombe and Tombs Pty Ltd, Melbourne, pp. 114 - 115.


65 ibid., p. 228.


68 Most members are based in Victoria.

69 Most members are based in Victoria.


71 Gott, B., *Written Submissions*, No. U7


77 Ibid., p. 56.

78 Ibid., p. 56.


80 Ibid., p. 56.


82 Ibid., p. 56.


ibid., p. 127.

ibid., p. 128-129.

ibid., pp. 24, 32, 127-134.


According to the Australian Quandong Industry Association


ibid., p. 63.


ibid., p. 128 -129.

ibid., pp. 24, 32, 127 -134.


According to the Australian Quandong Industry Association


ibid., p. 63.


ibid., p. 128 -129.

ibid., pp. 24, 32, 127 -134.


According to the Australian Quandong Industry Association


ibid., p. 63.


ibid., p. 128 -129.

ibid., pp. 24, 32, 127 -134.


According to the Australian Quandong Industry Association


ibid., p. 63.

128 ibid., pp. 10, 11, 14.
129 Pollen is also collected (but generally used to feed hives during seasons of low natural pollen; other minor products such as royal jelly (a secretion feed by bees to larvae), propolis (a resinous plant exudate deposited by bees in hives) and bee venom are sold in Australia but generally from imported sources.
131 Victorian Apiarist’s Association Inc - Resources Committee, *Written Submissions*, No. 58.
137 The *Livestock Disease Control Act* (1994) requires all persons keeping one or more beehives to register with Agriculture Victoria.
139 Victorian Apiarist’s Association Inc - Resources Committee, *Written Submissions*, No. U58.
140 Dr Dollin in *Australian Bushfoods Magazine*, Issue 10, April-May, 1999, p. 29.
141 Victorian Apiarist’s Association Inc - Resources Committee, *Written Submissions*, No. U58.
147 ibid., p. 13
151 Department of Natural Resources and Environment, *Written Submissions* No U67.
152 Undertaken by Ms Martine Kinlock, M. (1999), a post-graduate student, and Dr Anthony Cheshire, Senior Lecturer, Botany Department, University of Adelaide.
156 ibid., p. 9.

ibid., pp. 17.

ibid., pp. 8-12.


ibid., pp. 27-32


Bienvenu, F. Ovens Research Station, Department of Natural Resources and Environment, personal communication, 30 October 1998


ibid., p. 36.


ibid., pp. 27-32

ibid., p. 4.

ibid., pp. 168-169.

ibid., pp. 8-12.


ibid., pp. 17.

ibid., pp. 36.


ibid., pp. 168-169.

ibid., pp. 17.

ibid., pp. 36.

ibid., pp. 27-32
193 ibid., p. 10-11.
194 ibid., p. 13.
196 Greening Australia - Victoria Inc, Written Submissions, No. U51.
201 Pescott, T (1978), Natural Victoria, Rigby Ltd, Melbourne, pp. 73-74.
203 CSIRO (1990), Plants for Medicines - A Chemical And Pharmacological Survey of Plants in the Australian Region, CSIRO, Australia, Preface.

216 Duncan, A. (1999), Chief, CSIRO Division of Molecular Science, personal communication, 3 August 1999.

217 For example studies being facilitates by CSIRO in collaboration with several other Australian research facilities; Duncan, A. (1999), Chief, CSIRO Division of Molecular Science, personal communication, 3 August 1999.

218 Victoria’s Biodiversity Strategy reports that more than 900 species of Victorian plants are known to be rare or threatened. As plant surveys normally take little account of non-vascular plants (mosses, liverworts, fungi and algae), the loss of plant species is most likely to be much higher than is currently documented; Department of Natural Resources and Environment (1997), Victoria’s Biodiversity, Sustaining Our Living Wealth, Vol. 1, Department of Natural Resources and Environment, Melbourne, Vic., p. 9.


224 ibid.


228 On the property of Barry Clugston, Stawell, whose property was inspected during the Committee’s study tour program.


231 Department of Natural Resources and Environment, Written Submissions, No U67.

232 Cheshire, A, Senior Lecturer, University of Adelaide, (1999), personal communication, 11 March.

233 Department of Natural Resources and Environment, Written Submissions, No U67.


235 In 1990, nearly 100 families grazed 17,000 head of cattle on these lands.


237 ibid.

238 Robertson, J. (1999), Rural Project Officer, Greening Australia, personal communication, 23 August 1999.

239 ibid.

240 The property is owned and managed by Mr Peter Kroehn.


245 Greening Australia - Victoria Inc, Written Submissions, No. U51.
For example, Lindsay, A. (1989) *A Method for Assessing the Ease and Desirability of Establishing Tall Woody Vegetation for Control of Soil Degradation*. Department of Conservation and Natural Resources, Melbourne; and also


Non-indigenous species may, however, be more appropriate for use in situations where the site has been excessively altered, for example on salt-affected land.

Lindsay, A. and Youl, R. (1988) *Victoria Felix Improving Rural Land with Trees*, Graduate School of Environmental Science, Monash University, Clayton, Victoria, pp. 33; Western, and also


Being funded by the Rural Industries Research and Development Corporation.


ibid., p. 21.

ibid., pp. 21-22.

Bushcare is a community-based and Commonwealth Government funded program similar to Landcare, but which focuses and encourages the protection and rehabilitation of remnant bushland.


Mr Jim Robinson, J., Rural Project Officer, Greening Australia, *Minutes of Evidence*, 26 April 1999, p. 18.
CHAPTER 4
ANIMAL PRODUCT INDUSTRIES

• INTRODUCTION
• OVERVIEW OF CURRENT PRODUCTION
• COMMERCIAL FRESHWATER FISHING
• EELS
• AQUACULTURE
• EMU FARMING
• WILD-HARVESTING OF KANGAROOS
• GAME MEAT PROCESSING
• OTHER MINOR OR POTENTIAL SECTORS

INTRODUCTION

Native animals may be used to produce human and pet food, and for such products as processed skins and leather, feathers, oils, cosmetics and health-care aids, medicines and fertilisers.

A number of native animals are currently used in Victoria to create a limited variety of animal products. In this chapter the Committee reviews the current operation and potential of these animal-product industries. The Committee also considers the potential of those sectors operating elsewhere in Australia that may offer opportunities for Victorian industry.

Virtually all such animal product industries are consumptive of the species population, that is, they are reliant on the killing of individual animals.

The Resource

There are 111 species of mammal known to occur in Victoria (of which 91 are native non-marine species), 447 bird species, 133 reptile species, 33 amphibians, and 46 species of freshwater fish. Victoria also has an unknown, but huge, number of invertebrates - sponges, coelenterates (such as jellyfish and anemones), molluscs, crustaceans, spiders, insects and echinoderms (such as star fish and sea urchins).¹

Victoria’s mammalian fauna is particularly rich, reflecting a diverse range of environments within a relatively small area. However, only one species, Leadbeater’s
possum (*Gymnobelideus leadbeateri*), is found exclusively in Victoria - it is the State’s only endemic species.

The impact of European settlement has been particularly severe in the semi-arid zone of Victoria where, by the 1920s, about one-third of the species had been wiped out. The impact on native species was less pronounced elsewhere in Victoria. Indeed, Victorian zoologists report that:

> a few species have probably increased their range, but not necessarily their population numbers, as a result of the changes wrought by Europeans.  

Such species include:

> [the] common brushtail possum, eastern grey kangaroo, eastern horseshoe bat and the water rat. [In addition] the black wallaby is undergoing a dramatic expansion into western Victoria ... .

**Early Utilisation of Native Fauna in Victoria**

A number of common and readily obtained animal species were used by pre-contact Aboriginal communities and by Aboriginal and non-Aboriginal post-contact communities for subsistence use. It was, however, European immigrants who first developed commercial industries based on animal products.

In the 19th century a number of species of whale and seal were hunted in large numbers for oil, as well as, respectively, bone and skins. However, numbers had crashed by the mid-1840s and the industries collapsed. By the end of the 19th century huge numbers of koalas were being killed for their pelts; koala fur became an important export industry up until the 1920s, when numbers plummeted. The common brushtail possum (*Trichosurus vulpecula*) was also hunted for its skin (and still is in Tasmania). During the 1959 season, some 107,500 common brushtail possums were recorded as being harvested in Victoria. A smaller number of ringtail possums were also taken.

Platypus, brush-tailed rock wallabies and grey kangaroos are among the many other species that have been hunted in Victoria for production of food and fur, again principally in the 19th century and early 20th century.

These early industries were reliant on the wild-harvest of animals. Almost with out exception, they involved animals being killed at rates that were unsustainable. Consequently the industries were mostly short lived. In addition, as the wild populations diminished, public concern led to the enactment of legislation that gave protection to the affected species and restricted access to animals. Such legislation has continued, in various forms, up until the present.
OVERVIEW OF CURRENT PRODUCTION

Sectors Operating

Commercial fisheries have operated continuously since European settlement. In recent years a number of other animal-product industries have been established or re-established in Victoria. The main sectors currently operating are:

a) commercial fishing (this Inquiry covers freshwater fishing only)
   i) finfish
   ii) yabbies
   iii) bait

b) eels

c) aquaculture (that is, farming in water)
   i) freshwater finfish
   ii) marine fish (this Inquiry covers inland utilisation only)
   iii) hatcheries
   iv) yabbies

d) emus

e) kangaroo harvesting (now only outside Victoria)

f) game meat processing

g) an array of other minor sectors.

Processing of animals for skins, leather, oils, cosmetics and health-care aids, medicines and fertilisers is primarily undertaken by mainstream companies. The raw material obtained from native animals is, however, a minor part of their operation. For instance, the Victorian skin and leather industry revolves around sheep and rabbit skins, not the skins of native species, although these are also used. Companies producing cosmetic and health-care products may use (for example) emu oil, but only as one ingredient in a limited number of their products. The Committee has not investigated these types of processing activities. In contrast, the processing of native animals is a major part of the game meat processing sector - and is discussed below.

Each of the various animal product industries operates in distinct ways. Some sectors, such as emus and eels, are mostly ‘vertically integrated’, where the one operator will both produce the raw product and process it for sale. Other sectors, such as the kangaroo industry and commercial fishing, involve more specialisation, with some operators focussing on the wild-harvest of the animal and others on the processing of the raw product.

Some sectors focus on one species - such as the emu. In other sectors, such as aquaculture, a number of species may be used.
Methods of Production

Native animals may be:
   a) harvested from the wild;
   b) ranched; or
   c) farmed (including aquacultural production).

Wild-harvesting involves the removal of animals that are living in a wild population, or their eggs, for direct use.\(^7\) Ranching involves taking the immature animal or its eggs from the wild to be grown on in captivity for subsequent use.\(^8\)

Animals used in farm production are bred in captivity from captive stock. In this case no access to animals in the wild is needed. A Victorian example is emu farming, which now depends totally on captive-bred animals.\(^9\)

From the point of view of commercial production, each of the three methods offers different challenges. The size of the wild population and the level of sustainable harvest fluctuates with seasonal conditions. The result is uncertainty of supply for industries relying on wild-harvested animals and, to some extent, those involved with the ranching of animals. The difficulties associated with uncertain supply were raised with the Committee by representatives of the kangaroo-processing industry.

The rancher not only has to respond to the vagaries of wild supply but must also deal with many of the challenges that face farmers.

Unlike conventionally farmed animals, native animals do not carry the imprint of centuries of breeding on their behaviour and productive capacity. Their husbandry and health needs are often not well known.\(^10\) They are likely to contain considerable genetic diversity. Such factors place demands on farmers using native species to be particularly innovative, adaptable and able to withstand early low economic returns. Ability and resources to undertake their own research into production systems are also often required.

Not all species of native animal will be suitable for farming. For an animal to be suited to conventional farming systems it must breed readily in captivity and be reasonably easy to confine and feed.\(^11\) Its social structure should be gregarious so that it is not unduly stressed or aggressive when kept with a large number of its own kind. It should be resistant to diseases that cannot readily be controlled. It should be well adapted to prevailing climatic conditions and be capable of rapid and efficient growth when supplied with readily available and economic feed. Ideally it should, with moderate management inputs, have minimal adverse impact on the land where it is farmed.\(^12\) It should also provide a product for which there is a ready market or for which a market can easily be developed.
The various methods of production attract different regulatory regimes. For instance, in Tasmania if an animal is shot in the wild it is subject to game meat production standards, whereas if it is farm bred, domestic animal meat production standards apply. In Victoria, the processing of all meat is administered by the Victorian Meat Authority. As all wild-harvested native animals must currently be imported from other States, the actual slaughter, initial handling and transportation are subject to regulations in those States.

The different methods of producing native animals will also lead to different environmental outcomes. Management approaches to ensure sustainability of both the target species and ecosystems will also vary. For example, wild-harvesting where only large adults are taken will alter the structure of the target population and so can impact on its evolution and viability. This is less of an issue for captive populations, where more direct manipulation of the population will be undertaken anyway, but without impact on natural systems.

Taking eggs for ranching can threaten the target population and also species that prey on the eggs. Farming incurs the usual risks associated with animal husbandry, and also of polluting wild populations with populations that have been modified by translocation and captive breeding. This is not an issue for wild-harvesting.

**Attitudes to Native-animal-product Industries**

There was considerable divergence of opinions concerning native-animal product industries in submissions to the Inquiry. Opinions ranged from total opposition to support for a market-driven expansion of these industries provided sustainability objectives are met. In between was qualified support for the status quo, with no expansion of the species used in this way.

The submission of Wartook Native Fish Culture represents those favouring sustainable use of native species, but with the caveat:

> The commercial utilisation of any native fauna and flora should never be a threat to the conservation status of a species or population.

A number of submissions to the Inquiry supported the concept of commercial use of kangaroos, in particular in association with population control. Generally the proposal was to involve commercial shooters and use carcasses for meat and leather products. Representatives of recreational shooters raised the possibility of kangaroos being used commercially also being available as game. This suggestion is discussed in Chapter 5.

Representative of those who oppose native-animal products is the submission by Animals Australia, in which the organisation states that:

> Aware of the potential for cruelty and suffering to wildlife, Animals Australia opposes any increase in wildlife exploitation in Victoria, other than that
which is due to the enhancement of natural habitats and facilities to benefit wildlife, Victorians and visitors from interstate and overseas who wish to enjoy and appreciate them in a non-threatening way. Activities currently sanctioned that are known to cause pain, suffering and death should be prohibited.\textsuperscript{18}

**COMMERCIAL FRESHWATER FISHING**

Native freshwater fish and other aquatic animals support the main, albeit small, native-animal product industry in Victoria.

The catch of eels in 1996-97 was 184.7 tonnes returning approximately $740,000; the yabby catch was 22 tonnes returning $170,000; with the catch of other freshwater species (including non-native species) only about 1.3 tonnes fresh weight, providing a return of less than $10,000. In comparison with the total Victorian catch of 4,494 tonnes of finfish fetching more than $10 million,\textsuperscript{19} and the additional 580 tonnes of crustaceans, 2,170 tonnes of molluscs and 53 tonnes of ‘other’ species caught\textsuperscript{20} - the commercial Victorian freshwater catch, with the exception of the eel industry, is very small.

Eels (two species) and yabbies are by far the largest sectors of the industry.\textsuperscript{21} The main other species sought are:

\begin{itemize}
  \item a) golden perch;
  \item b) bony bream;
  \item c) freshwater catfish; and
  \item d) silver perch.
\end{itemize}

Freshwater bait is also caught, principally small yabbies or mudeye (or dragonfly nymphs).

Eels are caught south of the Divide in both Gippsland and the Western District.\textsuperscript{22} The main catch of yabbies is from the warmer districts around Horsham and Kerang.\textsuperscript{23} Freshwater netting of finfish is carried out mainly in the big lakes in the central north and north-west of the State, with some catches in rivers and smaller lakes. Bony bream is confined to the north-west and north-central sections of the State.\textsuperscript{24} Golden perch are found north of the Divide and silver perch are caught in western Victoria.\textsuperscript{25} Freshwater catfish are found in northern Victorian waterways. Bait species are caught in the Gippsland Lakes, in inlets and in some lakes/dams north of the Divide.

Netting is the main method used to catch most species. Fyke nets are used for eels. Larger yabbies are netted or caught in pots.\textsuperscript{26} Lines and pumps may also be used for bait gathering.
Data provided by the Catch and Effort Unit of the Department of Natural Resources and Environment is summarised in the following table. It can be seen that, with the exception of yabbies, the catch is generally stable or dropping.

**Table 4.1 Victoria’s commercial catch of freshwater fish in the years 1994 to 1997**

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Golden perch</td>
<td>3,339</td>
<td>4,805</td>
<td>3,885</td>
<td>3,877</td>
</tr>
<tr>
<td>Longfinned and shortfinned eels</td>
<td>252,589</td>
<td>239,827</td>
<td>182,965</td>
<td>162,012</td>
</tr>
<tr>
<td>Mudeyes (dragonfly nymphs)</td>
<td>741</td>
<td>334</td>
<td>347</td>
<td>235</td>
</tr>
<tr>
<td>Yabbies</td>
<td>6,382</td>
<td>6,191</td>
<td>17,345</td>
<td>25,507</td>
</tr>
<tr>
<td>All other (includes bony bream, freshwater catfish and silver perch)</td>
<td>16,326</td>
<td>5,731</td>
<td>22,054</td>
<td>4,554</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>279,377</strong></td>
<td><strong>256,888</strong></td>
<td><strong>226,596</strong></td>
<td><strong>196,185</strong></td>
</tr>
</tbody>
</table>

Source: Catch and effort data supplied by Fisheries Victoria, Department of Natural Resources and Environment.27

With eels in particular, and yabbies to some extent, there is overlap between the wild-harvest and the aquaculture-grown product, with some licensees involved in wild-harvesting, ranching and aquaculture of these species.28 Eel aquaculture production is similar to the wild-harvest catch. For yabbies, aquacultural production is much greater than the wild-harvest. Eel production is discussed more fully in the next section.

The main restriction on growth of the wild-harvest is the availability of the resource. Access to the resource can also be restricted for conservation reasons.29 At the same time, the short-term market tends to be inelastic, so that a sudden increase in supply could easily reduce unit returns to non-viable levels.30

In the case of yabbies, however, the aquaculture production is now much greater than that of the wild harvest, but this has not prevented the wild harvest from also growing, both in terms of catch and financial returns. The average price per kilogram increased from $5.20 in 1993-94 to $8.80 in 1997-98.

The Department of Natural Resources and Environment monitors the industry, through Fisheries Victoria. These bodies are responsible, under the Fisheries Act 1995, for ensuring that the State’s fish resources, and habitats that support them, are conserved by appropriate management.31 Commercial use of native fish and aquatic invertebrates is subject to licence or permit under the Act.
Approximately 80 licensed commercial fishers are involved in the harvesting side of the industry. Most operate under restricted licences - there are currently 18 endorsed for eels and 38 for the taking of bait. There are six unrestricted inland licences. The number of licensed eel and bait fishers has been stable in recent years, but the inland licences have dropped from 19 in 1995 to the present six in 1996. In addition, about half of the Gippsland Lakes/Lake Tyers endorsed finfish and bait fishers (32 and 10 fishers, respectively) catch freshwater species.

**Industry Strengths**

Though the industry is small, its products are of high value. As a decentralised industry, such returns can be captured by rural districts. Production and markets are reasonably stable or, for eels and yabbies, expanding.

The wild-harvest industry has developed markets that now provide openings for aquaculture activity. With eels and yabbies, and potentially other species, wild harvest and aquaculture can be complementary until aquacultural production meets the demand of expanding markets.

The industry also has the benefit of operating under an established legal and regulatory system (developed primarily for the much larger marine fisheries sector), a system that offers protection for both the licensees and the resource.

**Industry Challenges**

Expansion is limited by the availability of, and access to, wild resources. Over-fishing can easily deplete the resource. Use of netting techniques leads to by-catch of non-target species, including other native fish and mammals, some of which may be vulnerable to local extinction.

Accurate recording of catch and equipment is not always undertaken by commercial fishers. This, combined with changes to data-recording systems and turnover of staff of the regulator, reduces the accuracy and value of industry monitoring.

**EELS**

Eel products in Victoria come from wild-harvested and ranched eels, with the cultivation of ranched eels tending to take over from wild catch.

The total production is about 300 tonnes, most of which is exported to Europe, where it is held in high regard. Small quantities of eels are also exported to Asia.

As indicated in Table 4.1, the wild catch of eels in 1997 was 162 tonnes. The species caught in the wild are the widely distributed long-finned eel (*Anguilla reinhardtii*) and the short-finned eel (*Anguilla australis*). Many of the eels taken, however, are of insufficient quality for the demanding export market. This has led to a low-intensity
ranching system where young eels are transported to more productive waters for on-growing. These waters are mainly Western District lakes. The short-finned eel is the main species used.

These two species of eel have the greatest potential for aquaculture as well. The short-finned eel is a temperate species, though found as far north as central Queensland. The long-finned eel is better suited to sub-tropical climates.

These eels have a remarkable life cycle. The adults, at 10 to 25 years of age, migrate downstream to the sea to spawn at depths of greater than 300 metres. The tiny larval eels are apparently brought back to the continental shelf by ocean currents. There they metamorphose into ‘glass’ eels. These are then carried by tides into estuaries and coastal rivers where they develop into ‘elvers’ (now up to 1 to 3 years old). Elvers appear as small versions of the adults. They migrate further upstream into fresh water, where they develop into mature adults. The Australian short-finned and long-finned eels are thought to spawn in the Coral Sea. Thus, for Victorian eels, a journey of several thousand kilometres is involved in spawning and returning to fresh water.

Given the complexity of the life cycle, it is not surprising that these eels cannot be bred artificially. Stocks are obtained by annually harvesting glass eels and elvers during their migrations.

The bulk of the world’s current eel cultivation, of more than 130,000 tonnes a year, occurs in Asia, with significant production in Europe as well. Total Australian production is approximately 500-600 tonnes per year and worth $4-6 million. Victorian production (250 to 400 tonnes per year) is mainly exported to Europe and Asia as fresh, chilled or frozen whole eel. Some smoked eel is sold on the domestic market.

World production is declining and demand is growing. This is leading to increasing interest in intensive cultivation. A limitation could be the sustainability of the ranching aspect of production – the availability of glass eels and elvers is not unlimited.

There is no current intensive production of eels in commercial quantities in Australia. Most of Victoria’s production is from the extensive systems described above, in which wild elvers and sub-adults are released into lakes or wetlands and left to grow to marketable size under natural conditions. Additional elvers are imported from Tasmania for this purpose. These managed fisheries are a low-cost form of ranching or aquaculture. There are 18 commercial fishery licences for eel fishing in Victoria.

Eels Australis Pty Ltd described its production system in western Victoria in its submission to the Inquiry. The company nets eels in lakes that it stocks annually, as
well as other small lakes and dams that have wild populations of eels. The company value-adds to its product by limited processing.

Technology for intensive aquaculture production of short-finned and long-finned eels is being tested through a collaboration of State fisheries agencies and the Fish Research Development Corporation. Victoria is testing production from elvers. The market niche for intensively cultivated eels has yet to be determined. Greatest potential appears to be for small eels for the Japanese market and value-adding through local processing.

Eel production tends to be a vertically integrated business. Processing may be minimal preparation for transport – grading and freezing the entire fish or gutting and freezing. Cultivation of eels can build on well-established overseas technology, experience gained through the present Victorian production and an established market.

**Industry Strengths and Challenges**

The industry, though fairly small, provides a valuable product with a ready and expanding market. The current extensive ranching systems are relatively low cost and do not place producers in an excessively vulnerable financial situation.

Eel netting creates a by-catch of other aquatic species and water birds. However, one eel business has modified its nets to reduce such by-catch - it considers that this improved technology may make a case for wider access to wild eel populations.

Wild-harvesting is limited by supply and access to the resource, however the breeding of eels in captivity has not proved possible to date. Moreover, the sustainable limits to the taking of glass eels and elvers for stocking is not known. It is important that both the current ranching system and more intensive cultivation be kept below a level that threatens these stocks or associated aspects of the eel’s habitat. Sustainable limits are likely to restrict expansion of the industry. However, research into more intensive systems is being undertaken by the Marine and Freshwater Resources Institute.

Greater effort may be needed to expand the market as production increases.

**Aquaculture**

Aquaculture is the growing of aquatic organisms under controlled conditions; that is, it is the farming or ranching of fish or other aquatic animals.

The world’s wild-harvest fisheries are being over-exploited. “Leading international development agencies and governments are promoting aquaculture as a way of maintaining or increasing food supplies while relieving pressure on the oceans that are suffering from over fishing.” Currently aquaculture provides 23 per cent of world
fish production, and it has been estimated that this could grow to 40 per cent within 15 years.\(^{54}\)

At a national level the aquaculture industry is growing rapidly. In 1989-90 production was worth $190 million.\(^{55}\) By 1995-96 it was valued at $396 million.\(^{56}\)

Victoria has 230 aquaculture licensees, with most undertaking inland aquaculture.\(^{57}\) The 1997 production of about 2,000 tonnes was valued at approximately $18 million.\(^{58}\) Species include exotic species (mainly trout), eels, native finfish, crustaceans (mainly yabbies) and molluscs (mainly mussels). This represents about 20 per cent of the total Victorian fisheries production. The farming of introduced trout species still accounts for around 60 per cent of aquaculture production in Victoria.\(^{59}\) Some non-marine native species are farmed in Victoria, including warm-water native fish, yabbies and eels.\(^{60}\)

Intensity of fish farming varies from extensive to intensive. Still-water ponds provide the most common, but not the sole, technology used.\(^{61}\) Running-water farming is used for species requiring very high quality water, particularly excellent aeration.\(^{62}\) The most important quality factor is oxygen level, although pH, salinity, dissolved calcium and toxins such as pesticides are all important as well.\(^{63}\) Increasing intensity involves supplementary feeding and manipulating water quality (aeration).\(^{64}\)

Research into various aspects of aquaculture is currently being undertaken by the Marine and Freshwater Resources Institute at Snobs Creek, Alexandra. An example is the use of irrigation channels for fish farming.\(^{65}\)

Industry organisations, including the Warmwater Aquaculture Association and the Victorian Aquaculture Council, promote cooperation, training and transfer of information within the industry. The industry has also developed an Australian Code of Conduct for aquaculture. Codes of practice are currently being developed by the relevant industry sectors for the cultivation of specific species.

The Victorian Government has developed an Aquaculture Strategy (1998) in conjunction with these industry associations. The principle aims of the Strategy are:

a) long-term growth of the industry with a goal of a two-fold increase in the value of production by the year 2001;

b) diversification of species and sites; and

c) maintenance of a healthy aquatic environment.

**Industry Strengths**

Aquaculture is growing throughout Australia.\(^{66}\) In Victoria it is experiencing rapid growth and appears to be in a period of diversification and expansion.\(^{67}\)
Victoria has several native species, which the Aquaculture Council of Victoria describes as having:

Immediate commercial potential defined by a ready supply of hatchery-reared fingerlings, efficient diet and ready market acceptance. They are Murray cod, silver perch, golden perch and yabbies.68 Other species with table quality that are either on the endangered list or not currently being bred in commercial quantities are trout cod, Macquarie perch, Australian bass and estuary perch.69

Potential has also been identified for integrating fish and yabby production with irrigation farming.70

With Victoria’s mild climate, shallow ponds can be used to eliminate an accumulation of cold water at depth and the development of anaerobic conditions. Excessive fluctuations in water temperature are not likely. Once ponds are set up in Victoria, large quantities of water are not needed because evaporation rates are less than in hotter parts of Australia.71 The quality of effluent water leaving the system is high, as good water quality is fundamental to production. The consequence of this is that waste water from aquaculture presents only a minor pollution hazard.

A number of opportunities for training of new entrants to the industry are available. These include Deakin University, four of the Institutes of TAFE and industry-based training modules.72

Industry Challenges

As with any form of animal husbandry, success depends on a high level of management skill.73 Aquaculture stock, like any other stock, is prone to disease, particularly when there is stress, poor hygiene, or a source of infection is introduced. Predatory birds are a major problem, as also are predatory fish, water rats, foxes, snakes, tortoises and humans (poachers).74 Containing fish and other species so that there is no escape to the wild can be difficult.75

Control of water quality is also critical. Extensive systems using existing shallow wetlands are limited by the increasing valued being placed on natural wetlands. Moreover, pollution control authorities are:

cconcerned about waste waters from fish farms entering natural waterways
[and are asking] fish farmers to treat waste water before it is discharged into public waters and this adds to costs.76

Site requirements pose some restrictions on where aquaculture enterprises can be started.77 Species and site conditions must be matched. Relevant site factors are climate, water availability and quality, slope and soil type, surrounding land uses (low insecticide use), legalities (zoning, covenants), power sources, predators, proximity to markets, space, real estate value.78
Breeding peculiarities and complex life-cycles of some species make cultivation difficult. This is particularly the case with eels, but may also apply to other species and hinder their use in aquaculture.  

Information about many native species is less than adequate for good planning and management, and training opportunities are limited in regional areas. The choice of species that can be used is restricted in Victoria.

Complexity in the regulation of the industry has been creating difficulties for some, although the Aquaculture Regulatory Review program, which is currently addressing regulatory issues affecting the industry, has indicated that current legislation and regulation is reasonable.

Processing issues include responding to consumers’ concerns of health and safety. Processing must ensure that these can be guaranteed.  

Marketing a fresh product overseas can present problems of reliability of delivery and delays in payment.

**Aquaculture of Freshwater Finfish**

Murray cod, golden perch, silver perch and freshwater catfish are found in the Murray-Darling system. The biology of these species is fairly well known. All appear to be suitable candidates for cultivation. Murray cod is Australia’s largest freshwater fish and is highly prized as an edible fish. Numbers of this species have been greatly reduced as a result of changes to its environment, notably changes to the flood regime, as the species requires flooding to breed. This species is further threatened by overfishing as evidenced by a recent moratorium on fishing in South Australia saw a modest recovery in its population.

**Silver Perch**

Silver perch (Bidyanus bidyanus) provides an example of the potential of these species for aquaculture production. Silver perch is a native fish endemic to the Murray-Darling Basin. Hatchery techniques are well established and recent studies have shown it to be a species well suited to cultivation in earthen ponds. Feeding costs are relatively low and potential returns look very promising.

Farming of silver perch is in its infancy, but production occurs in north-western Victoria as well as elsewhere in the Murray-Darling Basin. This production and studies undertaken by New South Wales Fisheries provide solid information on husbandry techniques for the species. There are now sufficient farms to guarantee supply, and active market development can occur.

The fish is also ideal for the consumer. It has few bones and a mild-flavoured, moist, white flesh. It has good acceptance in a small, but profitable, domestic market based on wild-harvest. It is particularly well accepted for Asian cuisine and inland where other fish is less readily available than near the coast. These markets are expected to
grow. Additional markets can be developed if the fish is processed to provide a range of frozen and packaged products. Such items currently depend on wild-caught fish.

Identification of prepared fish as derived from aquaculture could be a strong selling point, as there is considerable community concern about the effects of pollution on wild-caught seafood and impacts of fishing on ecosystems. 88

**Murray Cod**

The Australias Cultured Eels company of Euroa was originally set up to produce eels for the domestic and export markets. In the last twelve months the company has diversified and is now focussed on growing Murray cod in an intensive aquaculture system. 89 This recent development has involved overseas investment.

Initial market tests show Murray cod to be highly regarded by Asian consumers. The company, though initially aiming at the domestic market, plans to develop export markets. Its plan is to sell 120-130 tonnes of Murray cod and eels this year. It also intends to establish its own hatchery. 90

Its production systems are technically among the most advanced in Australia. Such an approach involves high maintenance costs and high risk, but also potentially high returns. A virtually closed system is used, with water treated on site and 90 per cent recycled. 91 The expansion uses a modular approach (which could be adopted by smaller investors to move into ‘high-tech’ production in stages).

**Barramundi**

Barramundi, a high-value fish that is farmed in other States, is not presently permitted for aquaculture in Victoria. This prohibition is a response to the risk of spreading a virus affecting the species into Victorian waterways. 92 This virus, which was isolated in 1998, is regarded as a potential threat to other native species. Current Department of Natural Resources and Environment policy is that:

The Department will permit the development of Barramundi on-growing facilities in Victoria only based upon new technology that minimises risk to other fish species. 93

**Challenges**

Issues identified by the Rural Industries Research and Development Corporation for the aquaculture production of finfish are:

- a) refinement of production techniques to reduce costs;
- b) implementation of quality-control programs;
- c) development of processing to present the fish in a ‘consumer-friendly form’;
- d) selection of the most suitable strains for growth of ‘brood’ stock;
- e) research to identify key economic and marketing factors; and
- f) extension of the market through value-adding and active promotion. 94
According to the Marine and Freshwater Resources Institute, experienced and high-quality management and staff are of primary importance to the success of intensive aquaculture development.\(^7\)

**Inland Production of Marine Finfish**

Land clearing and agricultural systems used in Victoria and other mainland States have led to rising saline ground water and increasing river salinity. One of the methods used to mitigate these problems is the disposal of saline water to evaporation ponds.\(^6\)

The potential of using these ponds, where the water chemistry is suitable, for growing marine fish, particularly snapper and mulloway, has been investigated.\(^7\) This offers the possibility of putting to use ponds that currently are providing no direct financial return.

More intensive, and consequently more productive, cultivation could also be achieved by use of controlled (tank) systems.

Snapper and mulloway are good candidates for aquaculture.\(^9\) Both are popular commercial species and command good prices. A range of techniques for cultivating them is already well established overseas. Commercial farming of snapper and mulloway is being tested in sea cages on the NSW coast, but sea production is limited by a shortage of suitable sites. The Australian wild catch of snapper is declining and does not meet current market demand.\(^9\)

Farmed snapper at present has a darker skin than wild-caught snapper. This leads to reduced prices. A method needs to be established to lighten the skin colour of the farmed fish, or possibly a marketing strategy developed to overcome preference for the light skin.\(^9\) Marketing of mulloway has been only limited to date.

An additional species, which has potential for saline aquaculture, is brine shrimp.\(^1\) This small crustacean is used to feed fish in aquaculture or aquariums and may also be used as an aquarium specimen.

There is, as yet, insufficient data to evaluate the economics of cultivating marine species in saline inland waters in Victoria. Currently there are no such commercial operations in the State.

Saline waters can also be used in the production of some freshwater species. By diluting saline water with fresh water, conditions can be produced which allow cultivation of species that can tolerate moderate levels of salinity. The Committee observed this approach at the Ein Tamar aquarium in Israel.
Inland saline waters are currently used for intensive production of barramundi (a tropical freshwater species) in NSW. In other parts of the world a range of finfish and crustaceans have been cultivated in similar systems.

**Strengths and Challenges**

Substantial areas of central and northern Victoria have potential for this form of production, according to recent studies. Nonetheless, husbandry skills still need to be refined for production in inland waters. Maintaining ideal water conditions in a small, isolated water body can be more difficult than in the sea. When they are grown under less than optimal conditions, fish may be more vulnerable than normal to a number of pests and diseases.

**Hatcheries**

Hatcheries provide stock for aquaculture production or for the stocking of inland waterways.

Within Victoria hatcheries supply native species to stock aquaculture farms, farm dams and waterways for enhanced recreational fishing, and natural waterways for conservation purposes. In Queensland it has been found that a well-stocked waterway can attract visitors who will pay for the opportunity to fish in it.

The Committee inspected the Wartook Native Fish Culture hatchery in the foothills of the Grampians. The hatchery breeds seven species of freshwater and estuarine native fish - golden perch, estuarine perch, silver perch, eel-tailed catfish, Australian bass, Macquarie perch and Murray cod. The last five of these are listed as being ‘threatened’.

The proprietors focus on using stock indigenous to the region and of natural genetic diversity. Access to wild stock is only required to ensure that genetic diversity can be maintained. The hatchery is continually developing husbandry techniques for this new industry and actively involved in promoting cooperation and training within the industry. New husbandry techniques include use of hormones to stimulate egg formation and experimentation with artificial feeds.

According to Wartook Native Fish Culture, pricing is difficult as the market is immature (fingerlings at 5 centimetres are sold at $0.60 to $1.20 each). The species bred are sold for stocking of public waterways and private dams; such stocking is aimed essentially at recreational fishing and for farmers’ personal use.

The Shepparton Native Fish Hatchery at Central Kialla is one of the few warm-water operations in Victoria. It produces silver perch and yabbies, with a holding of...
Murray cod and golden perch brood stock as well. Stocks are used in the associated aquaculture farm or sold to other farmers.\textsuperscript{113}

The Department of Conservation and Natural Resources also operates hatcheries at its Snobs Creek Marine and Freshwater Resources Institute (MAFRI). Fish grown there are used for stocking of public waters for both fishing and conservation purposes (see Table 5.3). The native inland species grown are Murray cod and trout cod.\textsuperscript{114} Prior to the current year, Macquarie perch was also grown but this program (as well as stocking with the species) has been discontinued due to funding restrictions.

The two main functions of hatcheries, to stock inland waterways and to supply aquaculture farming, place different demands on the hatchery.\textsuperscript{115} For aquaculture the emphasis will usually be on selected strains and genetic uniformity; for stocking of waterways genetically diverse stocks derived from local populations are desired. Consequently, as the industry develops, “this is likely to lead to some hatcheries concentrating on re-stocking programs while others focus their breeding selection on seed stock for aquaculture production units”.\textsuperscript{116}

**Strengths and Challenges**

Hatcheries offer a source of resource for aquaculture and stocking that do not require wild-harvest. According to a representative of the Victorian Aquaculture Council: breeding fish and maintaining their ‘wild’ nature is an established and a highly regarded industry overseas and is becoming so interstate. It is an opportunity that we should take up in Victoria.\textsuperscript{117}

The Committee was interested to hear that the Department of Environment and Natural Resources obtains four of the five species used for stocking Victorian inland waterways are partly or entirely from New South Wales. The interstate stock is cheaper than hatchery stock available in Victoria and available in the quantities that are required by the Department - a minimum of 50,000. However, unlike some Victorian products, it is neither of the local genetic type nor genetically diverse.\textsuperscript{118}

**Yabbies and Other Crustaceans**

Yabbies are freshwater crayfish indigenous to Victoria.\textsuperscript{119} They are widely distributed throughout central and southern inland Australia. Two species have commercial value - *Cherax destructor*, which is indigenous to fresh waters throughout the State, and *Cherax albidus* which is found naturally on the South Australian border.

They naturally occur in the turbid, slow or still waters of rivers, creeks, swamps, lakes or billabongs, as well as irrigation channels and farm dams.\textsuperscript{120} Commercial wild-harvest is still permitted (see Table 4.1). Other States (NSW and South Australia) also permit wild-harvest, but catches are highly variable.\textsuperscript{121}
Yabbies are now in high and increasing demand, both within and outside Australia. Most of the current production goes to the domestic market. Overseas yabbies are seen as a quality, clean replacement for diminishing stocks of native European crayfish. Their capacity to be exported live to the major international markets adds to their attractiveness.122

Most yabbies are sold whole and cooked on the domestic and overseas markets.123 They can be sold at a wide range of sizes, from seed stock to table-size yabbies (50 grams plus). Intermediate sizes are used for manufacturing and garnish, as well as for pets and bait.124 Methods of sale include farm-door sales and sales to restaurants and wholesale markets. Markets are expanding, with producers adopting a more professional approach. Currently demand exceeds supply.

Export requires an export licence. Export of a live product presents peculiar problems. There can be difficulties obtaining payment and producers are at the mercy of the airlines. Cooperative or joint marketing by several growers in a district is seen to have advantages over a competitive approach. It allows for mutual support and more reliable supply.125

Yabbies have another potential use. They have been shown to be a suitable species to use as an indicator of some types of water pollution. Mercury concentrations in the abdominal muscle related well to levels in the water in which the yabbies were found.126

The use of existing farm dams to cultivate yabbies has allowed rapid expansion of the industry with relatively low set-up costs.127 This form of production has boomed in Western Australia where yabbies were introduced and assures continuity of supply - a fundamental requirement of retaining markets. Yabby farming is now close to becoming a mainstream industry.128 In 1997, total Australian production returned $2,139,000, with Victoria contributing 15 per cent of the total, or $325,000 from approximately 24 tonnes of product.129

Current production uses extensive farm-dam systems, semi-intensive ponds and a few highly controlled intensive operations.130 Transition from dam to larger-scale production has been occurring in Victoria over the last decade.131

Yabbies usually feed on detritus but need fairly high water quality to grow well. They are of high fecundity, gregarious, hardy, omnivorous and highly responsive to good husbandry. These features make them well suited to farm production. They travel well and so suit fresh export. Supplementary feeding may be used to prepare animals for market. Where this is done, special care to maintain water quality is needed. Turbidity, which is not the same as poor water quality, provides protection from predators, especially birds.132
Temperature requirements restrict regions in which good growth can be achieved in unheated ponds. Yabbies perform best in water temperatures of 18 to 35°C.\textsuperscript{133} Location and water quality influence growth. In farm dams at Dookie the standing crops ranged from 183 to 268 kilograms per hectare.\textsuperscript{134}

Other crustaceans with potential for aquaculture in Victoria are marron (\textit{Cherax tenuimanus}) and daphnia.\textsuperscript{135}

Marrons grow at a similar rate to yabbies and meet a similar market. However, they grow to a larger size and may command a higher price. They have been cultivated in Western Australia since the 1960s and are now farmed both extensively (for example in farm dams) and semi-intensively (in purpose-built ponds).\textsuperscript{136} About 25 per cent of production is exported, mainly to South-east Asia and Europe.

Marrons naturally occur in Western Australia under climatic conditions similar to northern Victoria, where they may have potential for aquaculture.\textsuperscript{137} However, the introduction of marrons to Victoria is currently prohibited because of the risk that they could establish feral populations and both prey on and compete with indigenous aquatic fauna.\textsuperscript{138}

Daphnia is a minute crustacean that is often harvested from sewage-treatment ponds. It is used as fish food and in aquaria. It has the potential to be a much more important source of protein, both for humans and stock. Production is currently very small and expansion of this sector would require vigorous efforts to develop distribution networks.\textsuperscript{139}

**EMU FARMING**

The commercial farming of emus (\textit{Dromaius novaehollandiae}) began in Western Australia in 1987 and by 1994 all Australian States permitted emu farming.\textsuperscript{140} A Federal Code of Practice came into effect in 1992.\textsuperscript{141} Emus breed readily in captivity and there is now an abundant supply of farm-bred birds - indeed by 1996 it was obvious that supply was exceeding the market for emu products. Wild-harvesting of emus is prohibited in all States.\textsuperscript{142}

Emus proved to be well suited to farming. A large number of breeding stock can be produced in a short time and the birds are ready for slaughter at 12 to 15 months. They are prone to few parasites and disease problems and those that do occur can usually be managed by careful attention to hygiene.\textsuperscript{143}

Commercial farming of emus within Australia occurs in Queensland, Western Australia, New South Wales and Tasmania, as well as Victoria.\textsuperscript{144} New Zealand, Canada and the USA also grow emus commercially.
The industry in the USA began in the late 1980s, grew very rapidly and then contracted as production outstripped markets. Currently there are approximately half a million birds held on 5,000 to 6,000 farms in the USA, where there is substantial promotion of emu products, particularly the oil and associated body-care products and pharmaceuticals.

Research on the status of the emu industry, as well as process and product development, has been undertaken by the Rural Industries Research and Development Corporation (RIRDC). Much of the production technology has been developed by the emu farmers themselves. Overseas studies are under way to test the medicinal value of emu oil.

Products
The emu has been described as the “most useable bird”. Saleable products include:

- a) meat;
- b) oil (from glands);
- c) skin; and
- d) feathers.

The meat is low fat and very low in cholesterol and used in smallgoods. The skin makes high-quality leather with an attractive appearance. The oil is used in cosmetics and for therapeutic products. There are also small industries associated with carving of eggs and use of feathers.

Key markets have been identified as the USA, Japan, France and South-east Asia. Australian research is providing valuable information on the desirable qualities of emu products. These include the high nutritional value of the meat.

The Victorian Industry
Emu farming was legalised in Victoria in 1994. By 1996 Victoria had more emu farms than any other State, with 782 farms out of a national total of 1,330. This high figure was partly attributable to the fact that Victoria set no lower limit on the number of emus required for a farm to be registered. Some of the early farms were hobby farms with only a few birds. Most emus were obtained from the Western Australian emu-farming industry.

According to the Emu Producers Association of Victoria (EPAV), the industry was initially based on the production and sale of breeding stock. Resultant high prices attracted approximately 1,000 new licensees. The emu proved to be very well suited to conditions in Victoria and numbers increased rapidly. By 1997 there were about 300,000 farmed birds in the State, with an estimated 5,000 to 10,000 emus slaughtered and processed in 1998-99.
The high success of breeding led to a large drop in the sale price of the birds. Increase in emu numbers was not matched by market demand. By September 1998 numbers of farmed birds had dropped to approximately 55,000. According to the Emu Producers Association of Victoria, the number of Victorian farms would now be less than 130. There has recently been a considerable contraction of the industry in Western Australia and overseas as well.

Farms are dispersed throughout Victoria. Most now are part of existing farms that are also involved in conventional agriculture. The farm-gate value of emus (1998 figures) has been estimated as $6-8 million.

The industry has been largely self-regulating, through the Emu Industry Development Committee (EIDC). This Committee was established in 1996 under the Agricultural Industry Development Act 1990 and has powers to collect and manage industry funds. Its charter includes research and industry development.

All emu farms must be licensed under the Victorian Wildlife Act 1975 and are monitored to ensure their compliance with the industry’s Code of Practice. This Code came into effect in 1995 and is incorporated into licences.

As elsewhere in Australia, the Victorian emu industry is dominated by producers who operate as ‘farm-to-market’ enterprises. That is there is little specialisation. The slaughter of animals is, however, usually undertaken off-farm, with the animals transported to accredited abattoirs by vehicle.

There are five abattoirs in Victoria able to slaughter and process emus. One, at Myrtleford, also processes ostrich products. With recent contraction of the industry in Victoria, slaughter of emus for meat is occurring in abattoirs not specifically dedicated to handling them. Slaughter is required to adhere to the Australian Code of Practice for Veterinary Public Health: the Hygienic Production and Inspection of Emu Meat for Human Consumption.

The Committee inspected the ‘Good Evans Emu Farm’ in March 1999 and saw the range of products that can be derived from the bird.

Industry Prospects
The industry is still facing a significant marketing problem for all products (meat, leather, oil and feathers). The Emu Producers Association of Victoria describes this as:

The typical boom and bust cycle experienced by most sunrise industries.

The production, processing and marketing aspects of the emu industry are ill-matched. Consequently, producers are unable to realise returns from the value-adding part of
the industry. The Emu Industry Development Corporation considers that this is essential to the viability of the emu industry.\textsuperscript{167}

As well as the rapid rise in emu numbers, the RIRDC identified several other factors which it considers have contributed to the industry’s current difficulties. Unlike other animal industries new to Australia (such as deer and ostriches) that have established international markets, emu products are unknown and the industry is in its infancy.\textsuperscript{168} New leather, in particular, takes time to be accepted and emu leather has proved difficult to manufacture to a high standard. Furthermore, early attempts by individual farmers to have totally integrated ‘farm-to-market’ systems have mitigated against cooperation within the industry and involvement of people with expertise in processing and marketing of products.

At the same time, the need for integrated processing was made clear to the Committee.\textsuperscript{169} Processing of the birds for all products needs to be done in a dedicated system that can harvest the meat, oil and leather to best advantage. Conventional transport and slaughtering systems do not meet this need. All three main products must be sold for an enterprise to be profitable.\textsuperscript{170}

The small but expanding ostrich industry in Australia also complicates marketing. Ostriches, originally from South Africa, also produce meat, oil and leather, and ostrich meat is currently more popular in Australia than is emu meat. Emu products might, however, benefit by being associated with the more-established (in world markets) ostrich products.\textsuperscript{171}

One consequence of the contraction of the industry appears to have been the illegal release of farmed birds. The Wimmera Catchment Authority drew attention to an incident of the illegal release of emus derived from Western Australia to the wild with the downturn of the industry.\textsuperscript{172} This could lead to genetic pollution of local populations.

Nonetheless, in the opinion of the Emu Producers Association of Victoria:

\begin{quote}

The commercial viability of farming emu has not changed in that time and it is now up to the industry to find markets for the product it produces. \textsuperscript{173}
\end{quote}

A study by the RIRDC suggests that the industry will shrink before growing again.\textsuperscript{174} The RIRDC still considers that present signs bode well for the future of the industry. It is currently undertaking research into identifying ways to improve husbandry, processing and marketing of products.

The Emu Industry Development Committee considers that the future of the industry lies in relatively low production levels of “unique product from a unique animal”. Extensive production systems using native grasses will promote protection of land and
native flora and reduce feeding costs.\textsuperscript{175} It believes that:

It is inevitable that the development of revegetated land with native grasses will play a large role in the economics of emu farming, both in the cost of production aspect and the increased price obtained in marketing a product derived in the most natural form possible.\textsuperscript{176}

\textbf{Industry Strengths}

The emu is well suited to domestication and farming under Victorian conditions,\textsuperscript{177} and produces a diverse range of highly useable and attractive products. The industry also has developed a strong base of breeding stock held in closed-cycle breeding enterprises (farms).

The Victorian Emu Producers Association is a vigorous organisation and is actively addressing the industry’s problems,\textsuperscript{178} the federal Rural Industries Research and Development Corporation is undertaking relevant research and development, and the Victorian Government provides information and advice to prospective entrants to the industry through a Specialised Rural Industry program.\textsuperscript{179}

A study by the IRDC indicated the following positive signs for the industry:

\begin{itemize}
  \item[a)] expanding markets and moves towards an ‘Australian’ industry focus and the development of cooperative marketing arrangements;
  \item[b)] development of an industry quality-assurance program for products,\textsuperscript{180}
  \item[c)] research focused on product development and gaining Therapeutic Goods Agency registration for the oil;
  \item[d)] increasing world interest in farming emus; and
  \item[e)] well-developed production technology.\textsuperscript{181}
\end{itemize}

\textbf{Industry Challenges}

The supply of all emu products currently exceeds demand,\textsuperscript{182} with emu farmers being forced to keep stock well past the preferred slaughter age due to the marketing problems.\textsuperscript{183} The Committee, during its inspection program, was told that many who invested in the industry have incurred large losses.

Well-integrated market development, needed to ensure that improved sales of all products match production, is still not available, as it is difficult to achieve with the current restructuring of the industry.

While emu products offer great potential, they are new to consumers. Consequently market development is more difficult than for more-familiar products. Initial marketing efforts achieved less market growth than was expected by the industry. The industry’s limited marketing funds and experience apparently contributed to this situation.\textsuperscript{184} The Australian industry also faces competition from imported emu products and other native-animal products.\textsuperscript{185}
The IRDC identified the following factors as necessary for the success of the industry:
   a) strategic marketing and control of supply in line with market signals;
   b) cooperation between specific groups of business expertise;
   c) quality-assurance programs across the industry;
   d) unique product characteristics identified and registered with the Therapeutic Goods Agency; and
   e) cost-effective service providers.\textsuperscript{186}

The Committee did not see evidence of a shift to use of native grasses and associated biodiversity benefits at present; rather emus are currently being raised in conventional semi-intensive farming systems.\textsuperscript{187} Future developments may, however, complement more ecologically appropriate approaches to farming in Victoria with the use of native grasses and herbs.

Farmed emus do not make any direct contribution to conservation of the wild species.\textsuperscript{188} Indeed, the illegal or accidental release of birds can (and apparently has) occurred, to the potential detriment of the genetic integrity of local populations.

The industry also has to deal with welfare issues, such as those raised by representatives of Animals Australia.\textsuperscript{189} These include an inadequate knowledge of the needs of the birds in captivity (a deficiency which, the Committee noted, is admitted by emu farmers) as well as problems with transport and inadequate methods for slaughtering large numbers of birds in abattoirs.

**WILD-HARVESTING OF KANGAROOS**

Wild-harvest of kangaroos is permitted in some, but not all Australian States. It is not permitted in Victoria.

The three species most commonly harvested for commercial use are the red, eastern and western grey kangaroos. These will be referred to collectively as the ‘large kangaroos’. In all three species the males are much larger than the females.

Large kangaroos are abundant in the semi-arid and more remote parts of all the mainland States.\textsuperscript{190} Their densities are relatively low in the more densely settled farmland and forested areas of Victoria.

**History of Kangaroo Harvesting in Australia**

Aborigines have hunted kangaroos in Australia for at least 6,000 years.\textsuperscript{191}

The advent of European agricultural systems has led to increases in the populations of larger kangaroos in parts of Australia, particularly the semi-arid zone. Elsewhere more intensive settlement has reduced populations. Thus there has been an increase in their density in some regions and some shift in their range.\textsuperscript{192}
As agriculture advanced, kangaroos soon became regarded as a pest. Development of a kangaroo industry began in the mid-1800s when the outstanding quality of kangaroo skins and leather began to be appreciated. This occurred without conservation-related controls or records of numbers taken.

In excess of 450,000 skins were harvested annually from Australia in the 1950s. In the 1950s developments in refrigeration allowed a substantial domestic and export market in kangaroo meat to develop. This was based on quotas. Quality of the product was poor or unreliable and most was used for pet food, though a small specialist market for human food was also supplied.

Export of skin and meat production peaked in the late 1960s and 1970s, then declined until recently. Poor meat quality and hygiene, and parasite infestation contributed to the loss of export markets.

Conservation concern in this period led, in 1971, to a Federal government report, Conservation and Exploitation of Kangaroos. This concluded that there was no threat of extinction of the large kangaroos and no need for a ban on exploitation. Its recommendations included that:

a) control of harvesting should rest with governments;

b) a system of managing kangaroo harvesting which is common to all States should be developed;

c) management of harvest should include setting limits to harvest, spelling areas from harvesting as necessary, tagging meat and hides to control harvesting, issuing of licences and paying royalties; and

d) marketing of meat to indicate that it contains kangaroo.

Continued protest in the 1960s and early 1980s (especially in the USA) led the Minister for Customs to withdraw permission for export of kangaroo products, although culling was accepted. Import of kangaroo products to the USA was banned in 1972 in response to claims that the large kangaroos were endangered. Such claims have occurred, and still occur, in the face of the fact that appendices to the Convention on International Trade in Endangered Species, which list species that are endangered or threatened, did not (and do not) list any of the commercially used species of kangaroo. After staff from the US Fisheries and Wildlife Service investigated the situation the US import ban was lifted.

Harvest quotas for Queensland, South Australia, Western Australia and Tasmania were set after consultation between State and Federal conservation authorities. Resurgence in the domestic and overseas meat markets is presently occurring. A small domestic market for kangaroo meat for human consumption opened in South Australia in 1980. Kangaroo has been well received as game meat in Europe, Japan, USA and Hong Kong.
Current Interstate Programs

Legislation controlling the kangaroo industry in those States that now allow harvesting conforms broadly with recommendations of the Federal Government’s report, Conservation and Exploitation of Kangaroos (1971). It varies somewhat but is all based on:

- Basic perception of the large, harvested kangaroo species as highly successful and abundant animals that present a pest problem to rural enterprises. All acts have as common objectives the maintenance of viable populations of kangaroos throughout their natural ranges and control of the industry with no heavier hand than is needed to ensure cooperation between industry and government in their mutual interest … in the welfare of harvested species.  

Thus the primary aim of regulations in these States is to perpetuate self-sustaining populations of each species throughout their preferred range. Regulations are not aimed at providing sustained yields for commercial benefit. Commercial use is seen essentially as a tool to manage kangaroo populations for the benefit of other forms of agriculture.

Environment Australia is responsible, under the Wildlife Protection (Regulation of Imports and Exports) Act, for approving State proposals for commercial utilisation of kangaroos. Each participating State must prepare and submit a management plan detailing the species involved and proposals for the level of harvest, population monitoring, harvest methods, monitoring of shooters and dealers, checks to prevent illegal harvesting and other conservation procedures. State authorities are responsible for the application of the plan.

Details of regulations vary between the harvesting States. They have general similarities in that annual surveys of kangaroo populations are used as the basis for allocation of quotas for each property on which harvesting takes place. Quotas allow only a conservative harvest to ensure maintenance of populations. Research has established that a harvest of 12 to 15 per cent of the population is sustainable and the figure of 15 per cent is used as the base quota. Additional allocations may be made where population surveys indicate that these can be sustained.

Quotas are administered through allocation of tags that must be attached to the carcass immediately after a kangaroo is shot. These tags are provided to licensed hunters either directly or through property owners or processors, after the payment of a fee or royalty. The tags are used to identify a kangaroo from the time it is killed to the end of processing. Equipment, method of kill and treatment of the carcass are specified to the licensed hunter. Licensed shooters are required to demonstrate sufficient skill to ensure that they hit the head, neck or upper body; that is achieve instant death of the kangaroo.

Data are collected on the location of kangaroos harvested, how they are shot, their sex and age. These data are used to monitor impact of harvest and other factors, such
as weather, on populations. Permits are also required for intrastate and interstate movement of kangaroos. Penalties are imposed for non-compliance with regulations.\textsuperscript{211}

The Committee was given to understand that, in spite of increasing demand for kangaroo products, the take in South Australia at least, is usually below the permitted quota of 15 per cent of the population. This may be due to the effort involved in night shooting, low returns to shooters or shortage of licensed shooters.\textsuperscript{212}

In Queensland 20 per cent of the estimated population has been harvested in some years without any evidence of a decline in the populations.\textsuperscript{213} This, according to staff of Environment Australia, may be due to the predominance of males in the harvest.\textsuperscript{214}

Monitoring allows review of quota allocation. Such review, combined with the allocation of shooting permits to specific properties, should ensure a sustainable harvest that is appropriately distributed in time and space.\textsuperscript{215}

\textbf{Products of the Kangaroo Industry}

Kangaroo products include skins, leather, game meat and pet food.\textsuperscript{216} Kangaroos culled in Victoria cannot currently be used to produce such products.\textsuperscript{217}

Meat for human consumption commands a considerably higher price than meat for pet food but also must meet more stringent health requirements. The Committee was informed that in South Australia all carcasses must meet standards for human consumption. This has led to the majority of kangaroo meat harvested in South Australia being used for human consumption. A large proportion of carcasses from other States is still used for pet food.\textsuperscript{218}

Kangaroos suffer from few diseases normally present in domestic animals and present little danger to human health. Two of the parasitic worms they carry are of aesthetic importance, and so affect sales for human consumption, but not health.\textsuperscript{219} Kangaroo meat has good health credentials as it is very low in fat.\textsuperscript{220} Furthermore, most kangaroo muscle is concentrated in the lower, higher-value part of the animal and the quality of meat does not appear to deteriorate as the animal ages.\textsuperscript{221}

Currently, however, there is an over-supply of carcasses for the available market.\textsuperscript{222}

Leather is an important product. Kangaroo leather is more expensive than cow hide but is stronger and more attractive than cow-hide leather. Japan is the biggest market for kangaroo leather. Europe (particularly Italy) also takes substantial quantities, particularly for manufacture of fine-leather goods such as shoes and handbags.\textsuperscript{223}

The Senate Inquiry was informed by the Kangaroo Industry that the period from 1985 to 1995 saw a steady (5 per cent) growth in value of kangaroo products nationally.\textsuperscript{224}
It estimated that the value of the industry in 1995 was $240 million - derived from an annual commercial harvest of large kangaroos in Australia of approximately 3.7 million animals. This value includes a component for alternative costs of kangaroo control programs. (These figures can be compared with the approximately 47 million cattle and sheep slaughtered in Australia each year, whose annual value was in excess of $5,000 million in 1997-98).

The value of the individual kangaroo products is, respectively, approximately $50 million ‘farm gate’, $40 to $50 million as pet food and $120 million for leather.

The industry has recognised the dangers of excessive competition and the need for cooperation to reduce duplication, avoidable costs and inadequate attention to marketing problems.

The Victorian Situation

A kangaroo-meat industry existed in Victoria prior to the development of National Game Meat Standards. As a result, the Victorian industry operated under different regulations from other States. Introduction of the national standards may have presented an excessive burden on the Victorian industry, which was largely aimed at the pet-food trade. The industry declined in the 1970s.

Commercial use of culled kangaroos was undertaken in Victoria in the 1980s to test the viability of a kangaroo industry in this State. It did not prove to be viable. The Department of Natural Resources and Environment (DNRE) concludes that:

The industry failed at that time because of the low numbers of kangaroos available, and the distances to be travelled between properties and points of processing, which made it uneconomic for the industry to continue. Commercial utilisation of kangaroos has not been permitted in Victoria since that time.

A professional hunter claimed that the kangaroo trial was “set up so that it was not really going to work” and inferences drawn from it are questionable. He considers that the results from it cannot be related to the likely outcome where locally experienced shooters cull kangaroos and carcasses are transported in suitably equipped and refrigerated vehicles. The result would be meat suitable for human consumption rather than “flyblown and putrid animals”.

Eastern grey kangaroos occur throughout the more extensively farmed parts of Victoria, while western greys are present in the west of the State. Both species are gregarious; the eastern grey kangaroos forming larger mobs. Relatively small populations of red kangaroos are found in the north-west of the State. Though probably experiencing periodic fluctuations, the population consists of approximately 6,000 individuals.
Compared with their densities in the rangelands of other States, these kangaroos are sparse in Victoria. Densities averaging more than 20 kangaroos per square kilometre are common over much of the New South Wales and Queensland rangelands, while less than one per square kilometre is normal for Victoria. The population of large kangaroos in Victoria was estimated in 1981 to be approximately 300,000. The estimate for the whole of Australia is over 19 million. Of course locally, and for short periods, mobs may gather, producing much higher densities.

Harvest is not considered necessary for population control over most of the State. Sixty per cent of land is privately owned, mainly as smallholdings, and largely clear of shrubs which are needed by kangaroos for shelter. Nonetheless, localised damage to pastures and crops may be significant and culling is permitted for damage mitigation under the Wildlife Act 1975. In 1997 the legal culling of about 30,000 kangaroos was permitted on private properties in Victoria, with smaller numbers culled as part of official conservation area management programs. Usually up to 50 kangaroos per property may be culled under permit on the permit-holder’s land (a number of agents may help) only in a three-month period. The number of kangaroos in the period may be increased or reduced. Carcasses cannot be removed from the farm but, subject to a permit, skins can be tanned for personal use. Under such kangaroo-destruction permits for damage control in Victoria, the number of kangaroos permitted to be destroyed has varied between 8,000 and 38,000 since 1982, depending on seasonal conditions. Staff of the DNRE assume that more are taken illegally.

A summary of cull permits issued in 1998 is given in Table 4.2 below. This indicates the maximum legal cull on privately owned or leased land.

### Table 4.2 Kangaroo control permits issued in 1998 by region

<table>
<thead>
<tr>
<th>Region</th>
<th>Number of permits</th>
<th>Number of kangaroos permitted to be culled on private land*</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Eastern grey</td>
<td>Red</td>
</tr>
<tr>
<td>Gippsland</td>
<td>294</td>
<td>0</td>
</tr>
<tr>
<td>North-east</td>
<td>402</td>
<td>0</td>
</tr>
<tr>
<td>North-west</td>
<td>254</td>
<td>21</td>
</tr>
<tr>
<td>Port Phillip</td>
<td>108</td>
<td>0</td>
</tr>
<tr>
<td>South-west</td>
<td>315</td>
<td>0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>1,373</strong></td>
<td><strong>21</strong></td>
</tr>
</tbody>
</table>

* Actual numbers killed are not known. In some cases when a permit is issued few if any animals are killed.

Source: Data provided by the Flora and Fauna Utilisation Program, DNRE.
Culling permits and total numbers permitted to be culled were fairly evenly spread over the State, with the exception of the most densely populated region of Port Phillip. The numbers permitted to be culled were also reasonably uniformly distributed throughout the year, although there was a trend to a late autumn/winter maximum in most districts. The actual number of kangaroos that were permitted to be culled under a single permit varied considerably, from over 40 to less than ten.

The number of permits given and kangaroos permitted to be culled has varied considerably with year, largely in line with seasonal conditions. Destruction permits were for 33,000 kangaroos in 1982 (a very dry year) and 8,000 to 10,000 per year from 1984 to 1989 (wetter years). Permitted cull climbed to a peak in 1998 of 36,805.242

At the public hearings, a professional shooter pointed out that the cull in Victoria is not based directly on kangaroo numbers but on observed damage to vegetation. Kangaroo numbers are not assessed and the cull program is not a “management program per se” as it is in those States that allow commercial use of culled animals.243

Staff of the DNRE confirmed that there is no regular assessment of actual kangaroo numbers.244 Consequently there are no reliable figures upon which an estimate of a potential harvest or impact of cull can be calculated. The numbers of kangaroos authorised to be destroyed for damage mitigation indicate that variation in available carcasses could vary from year to year, between 8,000 and 37,000.245

Should Victoria decide to commence commercial harvesting, survey and monitoring of kangaroo populations would be required under a State management plan. According to Environment Australia, monitoring would not be needed of the whole State, but only of those regions where harvesting was taking place.246

By way of comparison, some 3.7 million kangaroos are culled annually and used commercially in NSW, Queensland, South Australia and Western Australia.247 The kangaroo harvest quota in South Australia in 1997 was 938,000 animals.248

A recent internal review of the commercial aspects of the industry in relation to Victoria was undertaken by the DNRE. This concluded that:

a) There would be significant costs to developers (estimated at up to $400,000) associated with developing new kangaroo harvesting, transport and processing infrastructure in Victoria. No reasonable investor is likely to commit these funds without some certainty of adequate kangaroo numbers for harvest.

b) However, where the infrastructure is already partly or largely in place (and particularly where this infrastructure is presently being utilised commercially in other ways, for example wild-rabbit harvesting and processing for human consumption) and kangaroo harvesting and processing can be introduced without substantial cost (including unknown meat hygiene costs), then there may be a reasonable basis for commercial viability, even if limited to reasonably low harvest numbers.249
Opinions on the Desirability of Changing the Status Quo in Victoria

Strong differences in opinions have been voiced since the 1960s concerning the kangaroo industry. These express support of positions ranging from total protection to total eradication of kangaroos.\textsuperscript{250} There has also been considerable confusion between conservation and humanitarian arguments, as well as concerns that can be described as aesthetic. The last include attachment to a national emblem and repugnance at shooting as the means of killing an animal. These aesthetic considerations do not affect the well-being of the animal or its conservation, but have a considerable impact on public feeling.

The Committee found that there are still widely differing opinions concerning the desirability of commercial kangaroo harvesting. These were expressed in the submissions received by the Committee.\textsuperscript{251}

According to Lavery, in his book \textit{The Kangaroo Keepers}, conservation concerns are focused on:

\begin{itemize}
  \item the maintenance of viable populations of all native species, including kangaroos, in the presence of [humans] and [their] activities.\textsuperscript{252}
\end{itemize}

The Council of Nature Conservation Ministers has defined conservation objectives for kangaroos as being:

\begin{itemize}
  \item To maintain populations of the designated species of Macropodea over their natural range, and to contain the deleterious effects of kangaroos on other land management priorities.\textsuperscript{253}
\end{itemize}

According to Lavery, from a purely conservation point of view, the death and sustainable use of successful species for reasonable purposes is not exceptionable.\textsuperscript{254} Nonetheless, if large kangaroos are to be killed, this should be done with as little pain to the animals as possible.

A majority of those submissions that advocated the consumptive use of large kangaroos supported the approach used in other States where kangaroos culled for pest control are processed for meat and skin products.\textsuperscript{255}

Several submissions pointed out the difficulties faced by rural producers in localities where numbers of kangaroo or other native animals have increased substantially due to changes in pasture, crops and water availability, and the removal of predators.\textsuperscript{256} Problems listed include damage to fences and crops as well as increased grazing pressure on both pastures and remnant native vegetation.

Good farm management can be compromised where there is a large population of a grazing animal that cannot be controlled. One farmer explained:

\begin{itemize}
  \item As pastures are improved and watering facilities for stock developed it attracts more and more 'roos. Paddocks shut up for improved rotational
\end{itemize}
grazing or saved for lambing ewes are eaten out and efficient management is made difficult.257

The same farmer described inadequacies in the present Victorian damage control program.

Though it is possible to obtain a permit to shoot, the permit numbers are few, time involved and expense is more than most can afford. Any small reduction in numbers seems to be very quickly restored and though the shooting permit is a small deterrent it is of little practical help.258

In addition, several submissions expressed concern with the present damage-control system on the grounds that:

a) the cull is undertaken by non-professional shooters and so likely to be inhumane;

b) the system is ill-supervised and open to abuse;

c) lack of commercial valuing of kangaroos provides no incentive to conserve kangaroo populations or reduce the populations of hard-hoofed domestic stock;

d) the cull provides no information on the size of, and changes in, kangaroo populations; and

e) current controls lead to waste of the resource represented by the kangaroo carcasses.259

A professional shooter, in his evidence to the Committee, summed up much of the opinion in favour of commercial use of kangaroos in Victoria:

We have no kangaroo management program per se. The destruction permit system allows for the destruction of some kangaroos to address the problem [caused by excessive populations]. After the problem has been addressed, no-one really knows what is left. It is time we went along with, and joined the rest of Australia and had a responsible kangaroo management plan for the utilisation of the animals. Environment Australia ... should be involved [so that] economic and ecological sustainability can be brought to the fore for Victoria's kangaroos.260

Several other submissions decried the ‘waste’ of kangaroos killed during cull programs in Victoria.261 They emphasised that the method of kill must be humane and properly controlled to ensure sustainability of the kangaroo populations. Several suggest that such an industry would improve the welfare of the kangaroos and the information on their conservation status.

Use of kangaroos instead of, or to partly replace, hard-hoofed stock is seen as desirable from the point of view of land protection. Much of the damage done by exotic stock is the result of trampling and the way in which sheep and cattle tear herbage from the ground. Kangaroos have been advocated as a less damaging type of stock.262 This possibility, and the difficulties associated with it, are discussed in more detail in Chapter 7 in relation to ‘Integrated Grazing’.
The Natural Australian Meat Company submitted that kangaroos culled in Victoria should be supporting a processing industry in this State. Others, in calling for the rejection of the commercial harvest of kangaroos, asserted that the numbers culled in Victoria are inadequate to provide this support and that commercial use of kangaroos would produce pressure to take unsustainable numbers.

There is strong evidence that killing would be done most humanely by professional hunters. This evidence was questioned by several submissions to the Inquiry. One concern was with the fate of young-at-foot, that is young not in the pouch. While it is required that pouch young be killed by the shooter, young-at-foot are not likely to be killed quickly but, without their mother’s protection, die in the wild.

The submissions expressing opposition to the commercial use of kangaroos presented one, or generally several, of the reasons summarised above. Field-harvesting was rejected as unhygienic, cruel and beyond any possibility of adequate supervision. It was condemned as promoting a negative attitude to native wildlife and a distasteful use of a national emblem.

The concept of super-abundance was rejected; it was seen as a reflection of both current inappropriate land management and a bias in favour of exotic species. The Australian Conservation Foundation (ACF) questions kangaroo harvesting as a means of protecting soils and vegetation from damage caused by conventional grazing systems. The ACF considers that harvesting of kangaroos would do nothing to improve land protection, as farmers would still have strong incentives to continue current forms of production as well as take kangaroos. Impacts on biodiversity could result from selective harvesting of larger animals, causing excessive intrusion into the normal evolutionary processes.

**Potential Strengths of a Kangaroo-products Industry**

The three large species of kangaroo occur in substantial numbers in the less intensively farmed parts of Australia. Their numbers have increased in response to Western agricultural practices and removal of predators in some regions, particularly in the semi-arid zones. Interstate experience indicated that an annual harvest of 15 per cent of the populations is sustainable.

Kangaroo meat, if correctly handled, is a high-quality, low-fat product that is increasingly being accepted in Australia and overseas as a game meat. Kangaroo skins produce a high-quality leather for which there is a good market.

Systems based on substantial research and continual monitoring have been developed in several States to regulate the sustainable harvest and hygienic transport of kangaroos. These systems have been incorporated into management plans developed by four States in line with Environment Australia’s requirements for export permits. They ensure orderly and sustainable management of the harvest, transport and
processing of kangaroos. The Committee understands that, at least, the South Australian program is partially self-funding.

In Victoria, kangaroos are currently culled for damage control. Each year approximately 9,000 to 30,000 animals are authorised to be destroyed and left on site. There is potential for these to be used for kangaroo products. If such kangaroos were used commercially, they could provide additional income for rural districts, moreover, there appears to be support in rural communities for such commercial use of culled kangaroos. In addition, processing facilities for kangaroo products are already established in Victoria.

**Challenges for a Potential Kangaroo-products Industry**

While there are no comprehensive surveys of the demography of Victorian large kangaroos, it is known that the total numbers and density of populations in Victoria are low compared with those in other mainland States.

As elsewhere, the reconciling of the conflict between the prerogative of culling for population control and maintenance of viable populations, and the need of the processing industry for regular and reliable supply of carcasses, will be very difficult. Kangaroo populations, as well as available feed, vary from year to year. As a result the number of kangaroos available through either a population-control or a damage-mitigation program varies greatly as well.

Acceptability of kangaroo meat by the community is limited - the Australian market presently has a greater supply than demand, as more skins than carcasses are processed.\(^{272}\)

Costs to a developer to establish infrastructure for a new industry in Victoria (as opposed to expanding on an existing animal-processing industry) is estimated to be around half a million dollars. Returns from the industry will also be mainly made in the urban areas, where the processing plants are located, rather than in rural districts.\(^{273}\)

In Victoria and in many of the localities to which products might be exported there is considerable resistance to the idea of commercial harvesting of kangaroos for any reason. With Victoria’s comparatively small kangaroo population, minor inaccuracies in estimating sustainable harvest levels may have long-term adverse impacts on local populations.

Any export of product would require a management program to be created that would meet the requirements of Commonwealth legislation (see also Chapter 9).
GAME MEAT PROCESSING

Post-harvest care and processing are as important to the commercial success of native-animal products as their initial production. Such processing (for example killing, gutting and packaging) involves considerable extra cost and additional licensing. Hygiene is the essential issue, and several levels of government may be involved. Accreditation is required for the export of meat products.

Processing of kangaroo and emu is occurring in Victoria. Both are processed for more than one product, and this needs to be coordinated to realise best returns. In some cases basic processing is undertaken by the producer. This is commonly the case with aquaculture products and was described for eels in an earlier section.

Value-adding is sometimes done within Victoria – for example pure emu oil may be offered for sale in small containers as the pure oil or incorporated into body-care products; kangaroo meat can be cured to produce a high-value processed meat. Examples of such value-adding were seen by the Committee during its field inspection program. This included presentation of a range of emu products from the oil, leather, eggs and feathers as a cottage industry on the emu farms.

Emus must be slaughtered at an abattoir. The method is to electrically stun and then bleed the bird. With the decline in the industry, not all birds are now slaughtered in species-specific abattoirs. This presents problems for recovering the oil, which is contained in glands separate from the meat.

The Committee was told that quality emu leather production requires slaughter on the farm, as current transport methods incur the risk of damage to the skin.

Kangaroo Game Meat Industry

There are four processors of kangaroos in Victoria (as at March 1999). The Committee inspected two processing plants: Macro Meats in South Australia and the Natural Australian Meat Company in Melbourne. It also received a written submission from the Natural Meat Company.

The Natural Australian Meat Company started operations in June 1998. It obtains carcasses mainly from NSW and Queensland. Carcasses are chilled in the field and transported in chillers to Victoria. Transport costs and quarantine inspection fees of $10,000 per month are key issues for the company. Proximity to air-freight facilities, labour and other services offset these in Melbourne.

The company processes 3,000 carcasses a week and could handle 10,000. It produces prime cuts (fresh) and manufactured products such as smoked meat, mainly for the export market. Offal is sent to a blood and bone plant. Products are starting to be placed in Australian national chain supermarkets.
The Natural Australian Meat Company is expanding on the basis of interstate imports of kangaroo carcasses, though it would like access to culled animals from Victoria, subject to price structure. Apparently a viable kangaroo processing industry need not depend on Victorian harvesting but it will take some time to establish the enduring viability of this industry.

Macro Meats is one of six kangaroo processing plants in South Australia registered to produce meat for human consumption. The company is based in Adelaide and produces meat, mainly for the domestic market, and semi-processed skins.

The proprietors of Macro Meats explained the difficulties of uncertain supply associated with a cull program as the source of supply. Obtaining supplies from a wide geographic area alleviates this problem somewhat. Some use of casual staff also helps with the management of this difficulty, but plant and storage facilities are less flexible. Other problems, related to the poor early acceptance of kangaroo meat, are being overcome through strict hygiene and quality control and public education. It is in improving this acceptance further that the company sees the greatest potential for government input into the kangaroo processing industry.

According to both Macro Meats and members of the Bookmark Biosphere Trust, with whom the Committee also had discussions, development of kangaroo processing as small, regionally based industries is inhibited by small-scale and irregular local supply of carcasses.

The Committee was given to understand that the European markets, particularly those with a tradition of eating game meat, are central to a successful kangaroo-meat export industry.

**Strengths and Challenges**

The top of the market is characterised by small volume of expensive product provided to demanding buyers. The mass market is characterised by low prices, high volume and less-demanding customers. Most money is made in the mass market but margins may be small.

Marketing principles that have been described for the aquaculture industry could well be applied to any industries dealing with perishable food products, such as game meats. They include:

a) aim at a market which can be serviced by the output, equipment and workforce available;

b) make sure that the chosen market area can take the farm’s output on a sustained basis;

c) the closer the consumer to the producer, the better the price to the producer;

d) the product must be what the buyer wants;
e) consumer trends and seasonal trends need to be understood and used to advantage;
f) changes in the industry (technical, production and demand) must be monitored and used appropriately);
g) reliability in production and the market are needed;
h) good presentation is essential; and
i) produce what the buyer wants.

OTHER MINOR OR POTENTIAL SECTORS

Several potential uses of native land animals have been drawn to the attention of the Committee. These include the uses described below.

Cape Barren Geese

A small ranching operation on Flinders Island (Tasmania) is producing Cape Barren Geese for sale to Melbourne restaurants. 281 Eggs are taken from the wild and incubated under controlled conditions. The hatchlings are then raised in captivity.

Representation has been made to the Committee that similar ranching of native birds could be done in Victoria. The species has also been proposed for farming in Victoria. 282

Wild-harvesting of Possums

Several submissions referred to brushtail possums as a species that has commercial potential in Victoria. 283 They are harvested for commercial use in Tasmania. 284 Products are meat, most of which is exported to Asia, and skins. The latter are currently sold by New Zealand and were, until recently, marketed as ‘New Zealand Mink’. A potential market for incorporation of the fur into felt for Akubra hats is also being investigated in Tasmania. 285

The commercial harvest is small compared with the total cull of brushtail possums in Tasmania. 286 There has been a large increase in the population of this species since European settlement. This raises questions as to why, given the relative abundance of the resource, a larger industry has not developed. It is evident that the availability of native animals that can legally be used commercially is not a sufficient requirement for an industry to grow.

Farming of possums is also considered to be practical. 287 Possums could be fed on coppiced Eucalypt trees and attain weights of 600-800 grams in 18 months with up to 50 per hectare. A pilot-scale experiment has been proposed in Tasmania. 288 Products would be meat, fur and possibly aquaculture food or fertiliser from offal. Again, supply does not guarantee a viable industry.
There is also strong opposition to such use of possums.\textsuperscript{289} Concern was expressed in several submissions about perceived inhumanity of such uses, the treating of native animals as a commodity and the denigration of our natural heritage.

**Novel Products**

Novel uses of aquatic organisms were mentioned in the submission made by the DNRE.\textsuperscript{290} These include cultivation of freshwater pearls using mussels taken from the wild.

Potential medical uses of animal extracts have been identified. Emu oil has been noted above. Some mollusc species also show potential. For example, the egg mass of a common sea snail, the dog whelk, found on the south coast regions of NSW (and possibly Victoria) has been discovered to contain a powerful natural antibiotic.\textsuperscript{291} Development of the antibiotic now depends on further testing.

An example of innovative use of an identified niche market is the farming of Tasmanian seahorse. Seahorse is used in traditional Chinese medicine. Tropical species are endangered as a result of wild-harvesting. The plan is to supply this market by farming temperate species in Tasmania. The species used is proving suitable for aquaculture and the venture is on the point of commercial production.\textsuperscript{292}

Exploring the possibility of farming slaters (small land crustaceans) to convert native plant material into biomass to feed fish, poultry or other stock, and as fertiliser, has been suggested.\textsuperscript{293} While this is an unusual proposal, farming earthworms was regarded as eccentric once and it is now well accepted, with sales from mainstream retailers. The potential of native invertebrates to convert native plant material into a readily useable resource may be worth further consideration.

Farming of reptiles, particularly goannas, for skins, has also been proposed.\textsuperscript{294}

**Farming of Other Species**

Farming and harvesting of abundant species generally (for example corellas and possums) for land protection and pest control was advocated by the South Gippsland Conservation Society.\textsuperscript{295} This group considers that there is a need to replace conventional stock because of the damage they do to the land. The group emphasised that strict Codes of Practice would be needed for such uses.

A number of freshwater mussels are edible, including the widespread and hardy Vôtelunio ambiguus. This species is found throughout the Murray-Darling system in coastal rivers of Victoria, south-east South Australia and central NSW.\textsuperscript{296} Though these species are not currently commercially exploited, they are related to marine species that are cultivated in Victoria.
1 Department of Natural Resources (1997), *Victoria’s Biodiversity, Our Living Wealth*, p. 3.
3 ibid., pp. 5 - 8.
4 ibid., pp. 5 - 8.
5 ibid., p. 86.
8 ibid., p. 7.
9 ibid., p. 7.
11 Several submissions point out the difficulties which kangaroo behaviour poses to farming of macropods; for example:
   Victorian Farmers Federation Land Management Committee, Lobban, I., Chairman, VFF Land Management Committee, *Written Submissions*, No. U44;
14 Examples are: total opposition:
   Cowling, Y., *Written Submissions*, No. U22;
   de Fraga, C., Animals Australia, *Written Submissions*, No. U56;
   Australian Wildlife Protection Council, *Written Submissions*, No. U60. Examples of support for extended consumptive are, for example, from:
   Victorian Herpetological Society Inc., *Written Submissions*, No. U40;
   Wartook Native Fish Culture, *Written Submissions*, No. U4. Qualified support was given by, for example:
15 Wartook Native Fish Culture, *Written Submissions*, No. U45.
16 For example:
   McGowan, P., *Written Submissions*, No. U3;
   Ahern, P., *Written Submissions*, No. U71;
   Bant, R., *Written Submissions*, No. U21;
   The Natural Australian Meat Company, *Written Submissions*, No. U33;
17 Victorian Field and Game Association Inc., *Written Submissions*, No. U41;
   Victorian Game and Deer Stalking Association (VICGAME), *Written Submissions*, No. U47.
19 Department of Natural Resources and Environment (1998), *Fisheries Victoria Catch and Effort Information Bulletin 1998*, Department of Natural Resources and Environment, Melbourne Victoria, p. 3.
21 Department of Natural Resources and Environment (1998), *Fisheries Victoria Catch and Effort Information Bulletin 1998*, Department of Natural Resources and Environment, Melbourne Victoria, p. 3.
22 Information supplied by the Catch and Effort Unit of the Department of Natural Resources and Environment.
24 ibid., p. 199.
25 ibid., pp. 263, 400.
26 Information supplied by the Catch and Effort Unit of the Department of Natural Resources and Environment, 22 July 1999.
27 Data supplied by the Catch and Effort Unit of the Department of Natural Resources and Environment, 22 July 1999. The reporting system for Catch and Effort data changed in 1998 leading to difficulties of comparing data from before and after this date. Consequently data from before 1998 is used to determine longer-term trends.
29 ibid., 22 June.
30 ibid., 22 June.
32 All commercial fishers taking freshwater species in Victoria are licensed under the Fisheries Act 1995.
33 Data as at 1998 - supplied by the Catch and Effort Unit of the Department of Natural Resources and Environment.
34 Eels Australis Pty Ltd, Written Submissions, No. U43; and also Grant, P. (1999), Technical Officer, Marine and Freshwater Resources Institute, Alexandra, personal communication, 22 June 1999.
37 ibid., 22 June 1999.
40 ibid., pp. 102 - 103
41 ibid., p. 103.
42 ibid., pp. 102-103.
44 Department of Natural Resources and Environment (1998), Fisheries Victoria Catch and Effort Data Information Bulletin 1998, Natural Resources and Environment and Marine and Freshwater Resources Institute, Melbourne, Victoria.
45 Eels Australis Pty Ltd, Written Submissions, No. U43.
47 ibid., p. 103.
48 Mosig, J. (undated), Eel Australis Story, articles supplied to Austrasia Aquaculture.
49 Eels Australis Pty Ltd, Written Submissions, No. U43.
54 ibid.
57 Department of Natural Resources and Environment, Written Submissions, No. U67
58 A precise calculation of this figure is complicated by the eel industry. There is a continuum in the modes of production between wild-harvest and ranching of eels.
60 As discussed above, eel farming is strictly a ranching operation.
Trout Cod and Macquarie Perch are both listed as endangered while Silver Perch and Murray Cod are listed as threatened.

The Victorian Aquaculture Council, Written Submissions, No. U13.


The East Gippsland Institute of TAFE, North Melbourne Institute of TAFE, Sunraysia Institute of TAFE and the Wodonga Institute of TAFE; the Seafood industry of Victoria provides training modules as well.


The Victorian Aquaculture Council, Written Submissions, No. U13.


Barramundi is a tropical freshwater species, but is tolerant of saline conditions. It has proved to be well suited to both intensive and extensive aquaculture but has not been accepted for intensive production in Victoria because of disease risks. It may also be unrealistic for producers in a cool climate to try to compete with existing aquaculture production in climates where little or no heating is required.


ibid., p. 109.


ibid., p. 109.

ibid., p. 109.

ibid., p. 109.

ibid., p. 109.

ibid., p. 109.

ibid., p. 109.


ibid., p. 109.

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ibid., p. 109.

ibid., p. 109.

ibid., p. 109.

ibid., p. 109.


139 ibid., pp. 221 - 222.


144 ibid., p. 40.


154 Department of Natural Resources and Environment, *Written Submissions*, No. U67.

155 ibid.

156 ibid.


158 Department of Natural Resources and Environment, *Written Submissions*, No. U67.


163 Department of Natural Resources and Environment, *Written Submissions*, No. U67.

164 Evans, D., Emu Producers Association of Victoria; personal communication, 19 April 1999.

166 Emu Producers Association of Victoria, Written Submissions, No. U62.
167 ibid.
169 Evans, D., Emu Producers Association of Victoria; personal communication, 19 April 1999.
171 Cahill, G., Victorian Emu Industry Development Committee, personal communication, 1 February 1999.
172 Wimmera Catchment Management Authority, Written Submissions, No. U63.
173 Emu Producers Association of Victoria, Written Submissions, No. U62.
175 Emu Industry Development Committee, Written Submissions, No. U20.
176 ibid.
177 Emu Producers Association of Victoria, Written Submissions, No. U62.
178 ibid.
179 Natural Resources and Environment, Written Submissions, No. U67.
181 ibid., pp. 40 – 42
187 ibid., p. 42.
189 Animals Australia, Written Submissions, No. U56.
194 ibid., p. 79
196 ibid., pp1 – 6.
200 ibid., pp. 19 – 22.
201 ibid., p. 7 – 9.
204 ibid., p. 9.

Many, but not all, of these recommendations are now implemented.

This continues to be the policy to the present.
Rangelands are defined as “areas of native grasslands and woodlands that cover a large proportion of the arid and semi-arid regions of Australia,” (ibid., p. 84). Regular cropping is not practised and the predominant agricultural use, if any, is

\[ \text{Source: \textit{Rangelands of Australia}} \]


240 Department of Natural Resources and Environment, Written Submissions, No. U67.

241 Data provide by staff of the Flora and Fauna Utilisation Program, Department of Natural Resources and Environment, 21.7.1999.

242 Department of Natural Resources and Environment, Written Submissions, No. U67.


244 Department of Natural Resources and Environment, Minutes of Evidence, 3 May 1999.

245 ibid.


247 Department of Natural Resources and Environment, Written Submissions, No. U67.

248 Australian Bush Heritage Fund, Written Submissions, No. U32.

249 Department of Natural Resources and Environment, Written Submissions, No. U67.


251 For example:
Australian Conservation Foundation, Written Submissions, No. U1;
Royal Society for Prevention of Cruelty to Animals, Written Submissions, No. U17;
Cowling, Y., Written Submissions, No. U22;
Animals Australia, Written Submissions, No. U56;
Australian Wildlife Protection Council, Written Submissions, No. U60;
Kirby, R.; Written Submissions, No. U70; and
Ahern, P., Written Submissions, No. U71.


253 ibid., p. 161.

254 ibid., p. 100

255 McGowan, P., Written Submissions, No. U3;
South Gippsland Conservation Society, Written Submissions, No. U5;
Moran, M., Written Submissions, No. U19;
Bant; R., Written Submissions, No. U21;
Royals, S., Written Submissions, No. U24;
Miles, T., W. and Miles, G., Written Submissions, No. U28;
The Natural Australian Meat Company, Written Submissions, No. U33;
MP Game, Written Submissions, No. U34; and
Victorian Farmers Federation Land Management Committee, Written Submissions, No. U44.

256 McGowan, P., Written Submissions, No. U3;
South Gippsland Conservation Society, Written Submissions, No. U5;
Bant, R., Written Submissions, No. U21;
MP Game, Written Submissions, No. U34; and
Victorian Field and Game Association Inc., Written Submissions, No. U41.


258 ibid.

259 MP Game, Written Submissions, No. U34;
McGowan, P., Written Submissions, No. U3;
South Gippsland Conservation Society, *Written Submissions*, No. U5; and
Bant, R., *Written Submissions*, No. U21;

261 ibid.
262 Centre for Conservation Biology, University of Queensland, (1999), Internet site:
http://www.ccb.uq.edu.au/website/, 22 January 1999; and also
This was confirmed by a Royal Society for the Prevention of Cruelty to Animals (RSPCA) study described in
RSPCA, Melbourne.
266 eg Australian Wildlife Protection Council, *Written Submissions*, No. U60; and also
Kirby, R., *Submissions*, No. U70; and
267 Australian Conservation Foundation, *Written Submissions*, No. U12;
Animals Australia, *Written Submissions*, No. U56;
Australian Wildlife Protection Council, *Written Submissions*, No. U60;
Kirby, R., *Submissions*, No. 70; and
268 For example Cowling, Y., *Submissions*, No. 22;
Kirby, R., *Submissions*, No. 70;
Nursery Industry Association of Victoria, *Submissions*, No. 72; and
270 ibid.
272 Lavery, H. J. (ed.) (1985), *The Kangaroo Keepers*, University of Queensland Press, St. Lucia, Queensland; and
also
1999.
273 Department of Natural Resources and Environment, *Written Submissions*, No. U67.
275 ibid., p.162.
276 The Natural Australian Meat Company, *Written Submissions*, No. U33; and also
Melbourne. p. 172.
280 ibid., pp. 170 - 172.
281 Hall, G. (1999), Game Management Unit, Tasmanian Parks and Wildlife Service, personal communication,
4 March.
283 South Gippsland Conservation Society, *Written Submissions*, No. U5; and also Victorian Field and Game
284 Senate Rural Affairs and Regional Affairs and Transport Reference Committee (1998), *Commercial Utilisation of
285 Hall, G. (1999), Game Management Unit, Tasmanian Parks and Wildlife Service, personal communication,
4 March 1999.
286 ibid.

Ibid., pp. 16 - 17.


Department of Natural Resources and Environment, *Written Submissions*, No. U67.


Hall, G. (1999), Game Management Unit, Tasmanian Parks and Wildlife Service, personal communication, 4 March.


CHAPTER 5
ECOTOURISM AND RECREATION

• INTRODUCTION
• TOURISM
• ECOTOURISM AND NATURE-BASED TOURISM
• EXAMPLES OF ECOTOURISM AND NATURE-BASED TOURISM BUSINESSES
• WILDLIFE PARKS AND BOTANIC GARDENS
• NATURE STUDY
• RECREATIONAL FISHING AND HUNTING

INTRODUCTION

Ecotourism offers tourists the opportunity to visit, discover, understand and appreciate the natural environment. It is one of the fastest-growing segments in tourism in Australia and indeed the world. It is also a segment that can readily respond to the principles of Ecologically Sustainable Development (ESD). Victoria, with its ready access to a great diversity of natural environments and established infrastructure and operators, is an ideal location for ecotourism.1

While an array of recreational activity is undertaken by tourists, one does not have to be a tourist to enjoy Victoria’s natural environments and its constituent native flora and fauna. Many people undertake a diversity of recreational activity focussed on the use and enjoyment of native flora and fauna in their local environments.

In this chapter the Committee outlines current ecotourism activity and nature-based recreation in Victoria. Most such activity is non-consumptive of native plants and animals. Related sectors such as wildlife parks and recreational hunting are also covered. Activity in these sectors is consumptive - being reliant on the removal of plants and animals from their natural environment, either by way of killing the animal for sport or for translocation into captivity.

This chapter thus covers the following forms of utilisation:
  a) nature-based tourism and ecotourism;
  b) wildlife parks and botanic gardens;
  c) nature study and other forms of nature-based recreation; and
  d) recreational fishing and hunting.


TOURISM

Tourism is one of Australia’s fastest-growing industries.² It accounted for 10.5 per cent of Australia’s Gross Domestic Product (GDP) in 1995-96 (the latest year for which this calculation has been made to date),³ compared with 5.5 per cent of GDP in 1991-92 when it employed 6.1 per cent of the workforce. By the year 2000 tourism could be employing 8 per cent of Australia’s workforce.⁴ Tourism is also Australia’s largest export industry. Total export earnings from tourism in 1995-96 were $13.1 billion, approximately 12 per cent of total export earnings.⁵ Nationally (1996 figures) 40 per cent of tourist revenue came from overseas visitors.⁶

For Victoria the contribution of overseas tourists in 1995-96 to the Gross State Product was $9.4 billion.⁷

Though overseas visitors are the largest per capita spenders, Australians are by far the bulk of the market.⁸ ‘Tourists from intra- and inter-state accounted for 75 per cent of tourism visits in Victoria, with this domestic tourism accounting for (in 1998) $6 billion of direct tourism expenditure.’⁹ The domestic market should, in the opinion of Tourism Victoria, be the first target of the Victorian tourist industry.¹⁰

Trips to Victoria have been growing at an average yearly rate of 11 per cent since 1993 and reached 15.4 million in 1997.¹¹ Of the trips in 1997, 3.2 million were made by interstate visitors and almost one million by overseas tourists (overseas visits continued to rise in 1998 to 1,015,070).¹² Expenditure by overseas visitors to Victoria was $1.52 billion.

All relevant tourism strategies support the principle of ecologically sustainable development.¹³ Moreover, the tourism industry generally has a vested interest in Australia’s natural resources and a role to play in their maintenance. It is increasingly aware of these responsibilities;¹⁴ Preece et al (consultants to the Biodiversity Group of the federal Department of Environment, Sport and Territories) consider that:

A large ... proportion of [all] tourism in Australia is based on aspects of the natural environment, focusing particularly on biological diversity – the plants, animals, ecosystems and natural landscapes of Australia. Indeed, Australia’s [natural] environment has been identified as ... the key drawcard for international visitors.¹⁵

Tourism in which a relatively undisturbed natural environment can be enjoyed, is proving to be the most rapidly growing segment of Australia’s tourist industry.¹⁶ Some 50 per cent of overseas tourists visited a national or State park or reserve.¹⁷ In 1996-97 Victoria’s national parks and other reserves attracted 25 million visits, compared with 8 million visits only ten years earlier. The Bureau of Tourism Research considers that Australia’s natural features play an important role in attracting visitors to Australia.¹⁸ Recent studies have shown that 80 to 85 per cent of Japanese visitors and
70 per cent of European and American visitors to Australia identify nature-based factors, including wildlife, as key elements in their travel decisions.\textsuperscript{19}

There are still large opportunities for growth in this type of tourism for both overseas and domestic markets. It has been reported that many Asian tourists have expressed disappointment after visits to Australia, because they have not, in fact, experienced natural areas or wildlife in these settings.\textsuperscript{20} This is because of the shortness of their visits and the long distances between features in some States. For Victoria, with its relatively short distances between destinations and diversity of natural areas, this could pose less of a problem than for other States.\textsuperscript{21}

Natural areas are thus of substantial significance to tourism.\textsuperscript{22} A proportion of such tourism activity can be attributed directly to the viewing of native wildlife.

**The Value of Native Wildlife for Tourism**

Given the Terms of Reference of the Inquiry, the Committee is particularly interested in tourism that is specifically focussed on native species. While it is often difficult to separate the attractions of native flora and fauna from the more general attraction of natural scenery, many of those making submissions considered native wildlife as a distinct and important contributor to tourism, and considered that wildlife tourism had considerable potential in Victoria.\textsuperscript{23} The Victorian Tourism Operators Association confirmed that Victoria’s native plants and animals are an essential component of tourism outside urban areas.\textsuperscript{24}

The Committee was told that the penguins at Phillip Island are one of the main reasons for overseas tourists to visit Victoria, albeit an attraction largely dependent on a major investment in tourist infrastructure.\textsuperscript{25} The Penguin Parade Reserve attracts 500,000 paying visitors per year. This is an increase of more than 100 per cent since 1993, making it Victoria's third most popular fee-for-entry attraction.\textsuperscript{26} Of these visitors, 60 per cent come from overseas, with approximately half of these from Asia.\textsuperscript{27} It has been estimated that the gross annual economic benefit to Victoria was $96.5 million and 1,060 jobs in 1995-96.\textsuperscript{28}

The Melbourne Zoo attracted a total of 945,151 visitors in the year 1997-98 and more overseas visitors than any other paid-entry destination in Victoria.\textsuperscript{29} The Healesville Sanctuary attracted 327,300 visitors in the same year, with a high proportion of these being overseas tourists drawn by the focus on native animals and habitats at the Sanctuary.\textsuperscript{30} The Ballarat Wildlife Park, a private venture, is also one of the State’s biggest tourist attractions.

Research undertaken elsewhere in Australia has shown that such wildlife attractions are of particular interest to overseas visitors.\textsuperscript{31} For instance, wildflower viewing has been identified as the focus of three per cent of all overseas visitors to Australia, particularly those from the United Kingdom and Europe.\textsuperscript{32}
Australia is special in terms of its unusual and relic animal species and diversity of plants. While Australians may take kangaroos for granted, for non-Australians they are unique - being the only large animal that hops. Australia has other more subtle attractions - its arid zones (represented in Victoria by the Mallee) have, for instance, the world’s richest ant and lizard faunas.  

The presence of wildlife-based attractions may also influence tourists’ decisions to visit Victoria. As well as the penguins at Phillip Island, the seals of Port Phillip Bay and Western Port are of increasing interest, with dolphin-watching in Port Phillip Bay and whale-watching at Warrnambool major wildlife attractions of international appeal.

The Victorian Tourism Operators Association has confirmed that the reasonably close proximity of several attractions to each other is a good selling point for tourism in Victoria. The close proximity of the Penguin Parade, Seal Rocks Sea Life Centre and other wildlife attractions to each other on Phillip Island enhances the attractiveness of the district to tourists.

The presence of native species is also part of the attraction of national parks and reserves for tourists, as is illustrated in Table 5.1

<table>
<thead>
<tr>
<th>Location</th>
<th>Main attractions</th>
<th>Visitors per year</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Total</td>
</tr>
<tr>
<td>Grampians National Park</td>
<td>Wildflowers, scenery</td>
<td>1,444,200</td>
</tr>
<tr>
<td>Phillip Island Penguin Reserve</td>
<td>Penguins</td>
<td>496,690</td>
</tr>
<tr>
<td>Wilson’s Promontory National Park</td>
<td>Native plants and animals, scenery, beaches</td>
<td>378,784</td>
</tr>
<tr>
<td>Wilson’s Promontory Marine Park and Reserve</td>
<td>Native plants and animals, scenery, beaches and marine life</td>
<td>80,000</td>
</tr>
<tr>
<td>Gellibrand Hill Park</td>
<td>Cultural heritage, scenery, native animals, proximity to Melbourne</td>
<td>112,994</td>
</tr>
<tr>
<td>Healesville Sanctuary</td>
<td>Native animals</td>
<td>n/a</td>
</tr>
</tbody>
</table>


It is also known that nature-based tourists spend more on trips to Australia than do other tourists. One study estimated that nature-based tourism in the Grampians region brings $100 million to Victoria annually, with an overseas visitor bringing $6 for every $1 spent by a local.
At least for the mass market, icons are important. At a national level, kangaroos and koalas are examples. In Victoria, the little penguin is an additional example. Such icons are strongly linked with our national image and are at least partially responsible for tourism income of hundreds of millions of dollars. To a lesser extent, the knowledge of unique plant species such as banksias, waratahs and kangaroo paw and forests of the tallest hardwood tree (mountain ash) in the world may also contribute to the appeal. Thus, even where direct use of native plants and animals is not involved, tourism in Victoria can benefit from images of native species.

Preece et al. believe that convincing evidence can be produced to establish the economic benefits of natural areas to tourism. They recommend that:

Such information ... [be] widely disseminated to representatives of the tourism industry and to government policy makers to demonstrate the need for ongoing and improved environmental management of these special areas.

One submission received by the Committee estimated that a commercial ‘conservation industry’ - if not hampered by public-sector monopolies, could create:

A combined value of ... $10 billion with an annual turnover of over $5 billion per annum. It would employ 60,000 people. It would earn Australia $100 billion per annum in wildlife tourism. It would be worth as much to Victoria as its whole primary production combined.

ECOTOURISM AND NATURE-BASED TOURISM

In the past, the term ‘ecotourism’ has been used as, in effect, a marketing slogan covering any sort of activity vaguely related to the natural environment. The tourism industry now advocates the use of more narrow definitions of ‘ecotourism’.

The Committee understands that ecotourism is a niche within a broader sector of ‘nature-based tourism’. It contains a higher educational component and involves the local community to assist in the care of the resource. The National Ecotourism Strategy (1994) defined ecotourism as:

Nature-based tourism that includes an educational component and is managed to be sustainable.

As defined above, the use of the term ecotourism is thus restricted to those activities that genuinely include elements of environmental appreciation and education as well as being undertaken in an environmentally sensitive manner.

In response to this more restricted use of the term ‘ecotourism’, the term ‘nature-based tourism’ has evolved and is gaining more general usage. It is used to describe tourist activities that make use of natural environments but do not involve an overt environmental message.
In the opinion of Tourism Victoria, few of those operating nature-based tours within this State would currently meet the more restrictive criteria applying to ecotourism. Ecotourism has been assessed as accounting for only 5 to 10 per cent of Australia’s domestic nature-based tourist activity, though with much higher levels in regions where there is a focus on the intrinsic values of outstanding natural features.\(^{43}\)

Ecotourism is considered to “offer the potential for higher growth ... and less environmental impact than the [broader] nature-based segment as a whole”.\(^{44}\) The Bureau of Tourism Research considers that the potential for further growth of domestic ecotourism is quite large.\(^{45}\)

Ecotourism is one of the key areas on the United Nations Commission for Sustainable Development agenda, and the Year 2002 has been declared the United Nations Year of Ecotourism. It is now a recognised sector of the Australian tourism industry, with an active industry association, the Ecotourism Association of Australia, promoting, through publications and conferences, an exchange of information and ideas.\(^{46}\)

An array of other organisations is promoting and developing nature-based tourism and ecotourism programs, both in Australia and internationally. Examples are:

- the World Wide Fund for Nature Travel Club;
- university-based travel programs;
- the Australian Conservation Foundation; and
- the Pacific Asia Travel Association.\(^{47}\)

There appears to be an increasing desire among nature-based tourists to learn about and protect the natural resources that they enjoy. A 1994 Newspoll survey of holiday intentions of Australians found that more than 50 per cent of those interviewed included ‘enjoying nature’ among their intended holiday activities.\(^{48}\) Of those planning a ‘nature holiday’, more than 90 per cent considered ‘not damaging the environment’ as important, over 80 per cent rated ‘getting close to nature’ as important and almost as many were concerned to learn about nature.

These interests have been confirmed by a recent Australia-wide survey by Tourism Queensland. The survey questioned people who had taken a holiday away from family and friends in the last 12 months. It indicated that more than 60 per cent of those surveyed had some element of ecotourism in their interests and attitudes. The survey supports the view that there is “enormous potential for the development of ecotourism among Australian residents”.\(^{49}\)

Elements of ecotourism are becoming mainstream in much of outdoor tourism within Australia. According to Preece et al. in their report to Environment Australia’s Biodiversity Group, the whole tourism industry in Australia is “changing rapidly, and ... elements of nature-based and ecotourism can enter into all segments of the tourist
It is not only changing rapidly, but it is also growing rapidly. Currently it is estimated that there are more than 700 nature-based tour operators in Australia.

These Australian trends mirror those elsewhere in the world. While in Zimbabwe, the Committee noted that scenic boat trips on the Zambezi River are being marketed as wildlife cruises, with operators ensuring that visitors see wild crocodiles and hippopotamuses as an integral part of their experience. Indeed one tourist attraction inspected by the Committee is based on a single specimen of one plant - an ancient baobab tree estimated to be about 1,000 years old, with a circumference of 17 metres. The Committee is also aware that a grove of huge mountain ash trees in the Cumberland Valley, east of Melbourne, is of tourist interest, with one particular ancient mountain ash at a separate site, the Adeney Tree, being promoted as a tourist destination in its own right.

Ecotourism programs do not need to be based on minimal facilities and guided tours of remote undisturbed areas. While guided and unguided tours of natural areas may have low dependence on facilities, they may nonetheless be facilitated by the presence of defined tracks, toilets and interpretative information. Other forms of tourism business, particularly those targeting large visitor numbers, rely on major infrastructure to provide associated facilities for merchandising, hospitality and entertainment. The physical presence of such facilities may have an obvious localised impact. However, where these hazards are minimised, such facility-based ventures may meet the requirements of ecotourism accreditation. They may also provide access for visitors in a manner that can reduce the otherwise potentially substantial impact of large numbers of people.

Industry Strategies and Accreditation Schemes

States are developing a range of ecotourism policies and programs. Victoria’s strategy statement, Ecotourism ANatural Strength for Victoria, was prepared by the Department of Conservation and Natural Resources and adopted in 1992. Regional tourist strategies, developed in line with the State strategy, also emphasise nature-based tourism and ecotourism. For example, the Mallee Tourism and Recreation Strategy gives high priority to interpretation, education and conservation.

Ecotourism and nature-based tourism are identified in the Tourism Victoria Business Plan 1997-2001 as areas that would benefit from further development. This Plan claims that:

"Victoria has yet to fully capitalise on the State’s natural attractions in terms of tourism. Other States, especially the Northern Territory and Tasmania, have successfully positioned themselves as combining world class natural attractions with tourism related facilities. This has been achieved whilst maintaining an appropriate balance between conservation and development. Victoria must do the same."
Tourism Victoria is currently preparing a Nature Based Tourism Action Plan in response to requirements of the Tourism Victoria Business Plan.

A National Ecosystem Accreditation Program was established in 1997. It was the first such program in the world. Currently about 175 ecotourism programs are accredited around Australia under the scheme. The program was developed in response to the desires of the industry to maintain and improve its standards and reputation. Accreditation relies on meeting a range of defined criteria as measured through self-assessment, referee reports and annual review.

Parks Victoria, the manager of the greater majority of the State’s natural lands (including all national and State parks), recognises the value of such accreditation schemes. Non-accredited operators within its parks must obtain licences annually, whereas accredited operators are being offered longer-term licences.

**Victorian Attractions**

Victoria has many native-species attractions that are in easily accessible locations. Table 5.2 provides an indication of such attractions.

<table>
<thead>
<tr>
<th>Location</th>
<th>Native species focus</th>
<th>Features</th>
</tr>
</thead>
<tbody>
<tr>
<td>Serendip Sanctuary</td>
<td>A wild mob of eastern grey kangaroos, water birds and emus</td>
<td>Sightings can be guaranteed; natural populations – enthusiastic management</td>
</tr>
<tr>
<td>Brisbane Ranges</td>
<td>Koalas</td>
<td>In natural conditions in Victoria (elsewhere in Australia populations are not seen in the wild).</td>
</tr>
<tr>
<td>Central Highlands</td>
<td>Mountain ash</td>
<td>The magnificence of these tall forests is impressive to visitors not used to them</td>
</tr>
<tr>
<td>Grampians and Little Desert</td>
<td>Wildflowers and birds, especially the wide diversity of parrots</td>
<td>Sighting assured, in fine scenery</td>
</tr>
<tr>
<td>Various, such as Melbourne’s parks and gardens</td>
<td>Arboreal mammals such as possums and gliders</td>
<td>High diversity and sightings assured on night tour</td>
</tr>
<tr>
<td>Werribee, Western Port, East Gippsland</td>
<td>Water birds</td>
<td>High diversity close to other attractions</td>
</tr>
<tr>
<td>Port Phillip Bay</td>
<td>Water birds, dolphins, sea lions, penguins</td>
<td>Diversity within a day tour</td>
</tr>
<tr>
<td>Alpine area</td>
<td>Alpine flora</td>
<td>Available only in Victoria, Tasmania and southern NSW. Victoria has such attractions close to the State capital</td>
</tr>
</tbody>
</table>

Source: Victorian Tourism Operators Association.
CHAPTER 5
ECOTOURISM AND RECREATION

Public Land Activity

Much of the nature-based tourism in Victoria is based on public lands - simply because the greater majority of remnant natural habitat in this State is located on such land.

Since December 1996, Parks Victoria has had the responsibility for the management of the greater majority of Victoria's national, wilderness, State and coastal parks and nature conservation reserves as well as an array of other Crown Reserves in Victoria. These cover 3.75 million hectares or 16 per cent of Victoria and represent most of the main ecosystems in the State.

There were over 32 million visits to lands managed by Parks Victoria in 1997-98 and a similar number in 1998-99. Almost 12 million of these visits were to metropolitan parks and 12.3 million to protected non-urban parks. People who visit these areas have indicated that they do so to find relatively undisturbed areas. They tend to oppose elaborate developments such as accommodation in national parks.

A wide range of interpretive services is provided by Parks Victoria and its contractors. Native species feature prominently in these services. They include literature, activities and conducted visitor tours. For some parks and particular activities the importance of native species is clear. Examples such as possum spotting in Jells Park, the kangaroo-viewing trail at Cardinia Reservoir, cruises incorporating observation of the little penguin colony at St Kilda Breakwater, demonstrate that observation of native species is important in popular recreational parks as well as in national parks.

Three hundred and seventy three tour operators were permitted to use areas managed by Parks Victoria in 1997-98. They offered 550 activities in national parks and forested areas - including bushwalking and cycling, as well as adventure-based sports such as abseiling, rock climbing and rafting. The presence of native species contributes to the enjoyment of such activities, but to an unknown extent.

Education, as well as recreation, is an important function of these parks. This is provided for schools and the community.

Private Land Habitat and Tourism

There is a growing interest in conserving remnant habitats on private land and a growth of nature-based tourism on private properties. Approximately two-thirds of Victoria is held under private tenure and used for various forms of agriculture. Consequently, protection of remnant vegetation on this land is important and can contribute to the attraction of an area for tourists. Even where native vegetation on private land is not used directly for tourism it makes an important contribution by extending wildlife habitats. Where protection of natural areas on private land is assured, tourist investment may be encouraged.
Preece et al. recommend:

A national system of NBE [nature-based tourism and ecotourism] for private lands with high conservation values and sympathetic managers/owners who wish to develop a tourism enterprise. Part of the revenue from such enterprises would go towards managing the private reserve. Land covered by such agreements would be given support for: the rehabilitation of land, ... establishment of native vegetation corridors, ... technical support; development of a monitoring and reporting program; ... and the integration of data into national park and national monitoring databases. In addition, assistance should be given for the development of NBE enterprises. Such assistance would include business planning, training, product development and marketing.  

**Industry Strengths**

Victoria has a well-developed tourist sector and can offer many attractions within a relatively small area. Given recent research indicating the “enormous potential for the development of ecotourism among Australian residents”, and the increasing trend towards short-break tourism, Victoria is well placed to capitalise on these trends.

The nature-based tourism industry sector now has a large number of participants, and strong industry organisations such as the Victorian Tourism Operators Association and Tourism Training Victoria provide a solid base to develop markets.

Though Victoria has yet to identify many of its natural attractions as tourist destinations, there is the potential to introduce new attractions in the future and this reduces the risk of over-reliance on too few features. Key programs and locations for development identified by Tourism Victoria include southern Port Phillip Bay, Phillip Island, the Grampians and East Gippsland. In each of these regions wildlife and (for the Grampians particularly) native flowers are essential to the total experience.

The development of strategy and action plans by Tourism Victoria and the Department of Natural Resources and Environment, and accreditation and training programs, will provide increasingly strong foundations for the growth of nature-based tourism and ecotourism. Parks Victoria is already considered to be “one of the most advanced protection area managers in licensing tourism operators”.

One of the advantages for the Victorian economy of tourism, particularly nature-based tourism and ecotourism, is that it is labour intensive and can direct returns to regional areas.

Tourism generally, as well as nature-based tourism specifically, is a substantial user of natural areas and native species. It has the potential for sustainable use of these resources and can, if appropriately managed, provide incentives for their protection.
In addition, ecotourism is playing an important role by leading tourism more generally in the direction of ecological sustainability.\textsuperscript{73} 

Individual tourism operators may find difficulty in reconciling their immediate business requirements with the longer term care of the shared public resource. Consequently ecotourism that is unregulated may not necessarily be sustainable.\textsuperscript{74} On the other hand, well-regulated, planned and managed nature-based tourism and ecotourism can provide the following on-going social and economic benefits:

- rationale and resources for conservation of natural and cultural areas;
- fostering of a broad conservation ethic;
- regional and national economic gain;
- regional employment and skills development;
- revitalising of local communities; and
- local infrastructure and service development.\textsuperscript{75}

\textbf{Industry Challenges}

No Victorian location that features native plants or animals rates in the twenty most popular tourist destinations in Australia.\textsuperscript{76} Destinations chosen by international visitors are currently highly concentrated in NSW and Queensland. Victoria is also competing with other countries in attracting international visitors to its natural areas and wildlife, some of which have very well developed products based on high profile national parks and reserve systems.\textsuperscript{77}

The visible success of a few major tourism destinations has encouraged unrealistic expectations of the industry.\textsuperscript{78} Small tourist operators may offer high quality experiences but have limited marketing resources.\textsuperscript{79} Moreover, most operators currently involved with nature-based tourism cannot be regarded as ecotourism operators - they have merely identified a lucrative market and are primarily focused on profits.\textsuperscript{80}

For nature-based and ecotourism where group sizes are small, profit margins are tight and the industry fragmented.\textsuperscript{81} Financially marginal operators (such as those developing businesses funded by retirement packages) may drive down returns to other operators. An additional factor that operators need to address is safety. Visitors to unfamiliar areas may well face hazards with which they are unfamiliar. Their safety is a legal, economic and moral responsibility of tour operators. During its study tours the Committee was made aware of the problems posed by irregular clientele and the spasmodic employment it provided in nature-based tourism.

To date Victoria's nature-based tourism has focussed on a small number of species. Such a narrow focus involves a limited experience and high risks - interest in a species can flag or the population of the favoured species may decline.\textsuperscript{82}
As with any other industry, returns depend on appropriate market development. This must relate to what the potential customer wants. The need to consider the client is nowhere more clear, or more difficult to manage, than with native-species-based tourism, where the clients tend to be both demanding and clear about what they want.  

The development of opportunities in nature-based tourism is also hampered by deficiencies in information and training. Major research initiatives (most notably the research undertaken by the Bureau of Tourism Research) tends to be focussed on the demand side - there is very little research on the adequacy of supply. Even basic information on the size, economic contribution and impacts of the tourist industry may be difficult to obtain, partly due to a lack of precision in the definition of tourism. For example, tourism is not identified as an industry by the Australian Bureau of Statistics' data-collection process.

Another issue, affecting operators who work across State boundaries in particular, is the great variability of lease, licensing and permit requirements between States.

While tourist activities do not directly ‘consume’ plants or animals, they are not without impact. Impacts may arise from mere presence of the tourists themselves to those arising from the construction and operation of facilities supporting tourist activity. For tourist activities to be sustainable, these impacts should either not exceed the self-sustaining capacity of the ecosystem or be subject to management inputs that ensure that the natural resource base is maintained. While all relevant tourism strategies support the principle of ecologically sustainable development, the translation of these strategies into practice is often not evident. Visitors may espouse an intellectual belief in sustainability, but behave with less than desirable care when relaxed on holiday.

While tourist operators often rely on well maintained parks and nature reserves, the funding of such maintenance has been found, worldwide, often to be inadequate.

**EXAMPLES OF ECOTOURISM AND NATURE-BASED TOURISM BUSINESSES**

The Committee had the opportunity to visit a number of ecotourism operations in Victoria, as well as elsewhere in South Australia and Zimbabwe. Ecotourism operations based on captive populations of animals are reviewed in a subsequent part of this chapter dealing with zoos and wildlife parks.

**Phillip Island Penguin Parade**

The Penguin Parade is a key part of the Phillip Island Nature Park, a park created in 1996 to bring together all the natural public land areas of Phillip Island. It is managed
by a Board established under Section 14 of the Crown Lands Reserve Act 1978. The Nature Park’s mission is to achieve ‘International Excellence in Ecotourism’.

The physical features of the facility include visitor amenities (including a shop and cafeteria) and interpretation centre, board-walks, and concrete viewing stands adjoining the beach that the penguins cross as they return to their burrows each night. The presence of the little penguin (Eudyptula minor), and visitor interest in this bird, are the sole reasons for establishment of the facility.

The Penguin Parade is the focus of visitor activity within a larger reserve that encompasses about one-third of Victoria’s total penguin population (26,000 birds in all). The population is gradually increasing following the destruction of 80 per cent of the birds’ former breeding areas on Phillip Island since the turn of the century.

The Penguin Parade provides a proven internationally successful visitor experience. It attracts over 500,000 visitors a year, of which approximately 300,000 are international visitors - mostly from Japan, Taiwan and elsewhere in Asia. Domestic visitors are from Melbourne (53 per cent), eastern Victoria (14 per cent) and Sydney/NSW (14 per cent). Over 10,000 students participate in its environmental education programs each year.

The Phillip Island Nature Park receives no government recurrent funding. Though a public-sector operation, it is self-funding. Eighty per cent of income comes from the Penguin Parade. Estimated economic benefits include $6 million to Phillip Island and $96 million to Victoria (1998 estimate).

The Board of Management considers the following factors as key contributors to its success:

- close viewing of penguins;
- effective habitat management based on detailed research;
- high level of ranger presence; and
- high quality of visitor centre facilities.

The high profile and financial success of the Penguin Parade provides an income stream that is used to manage the non-revenue-producing areas of the Nature Park - including an active control program of introduced predators and a ‘penguin hospital’. A research program is also funded, with research undertaken into the biology, distribution, foraging ecology and management needs of the penguin. Five full-time research staff are employed. Some of the research programs have been jointly sponsored by industry. Research is overseen by an independent Scientific Advisory Committee. The Board of Management also fosters a Penguin Study Group that has undertaken penguin research for many years. The research guides management programs.
The Board of Management involves community volunteers and school groups in monitoring, visitor control, ecosystem restoration and development of management plans. Marketing is an important aspect of the operation - the Board actively promotes Phillip Island to overseas tour operators and collaborates with other tourist ventures on Phillip Island in promotion.

Future challenges are to increase and enhance penguin habitat, instigate nature-based tours for small groups, implement sustainable resource management (such as energy-efficient systems), upgrade facilities and make better use of facilities through daytime activity.  

**Seal Rocks Sea Life Centre**

This 'visitor/interpretive centre' is promoted as the 'zoo of the future'. The focus of the Centre is a theatrette showing 'real time' remote viewing of an offshore fur seal colony. This facility enables visitors to observe the seal-breeding colony without creating disturbance to the animals.

The developers of the facility have gone to considerable expense to create an educational focus to the tourist facility. Extensive areas of the centre are devoted to displays and interpretation of the local wildlife. It also provides free ranger-guided tours, with targeted educational programs for schools. A range of amenities is provided, including eateries, a gift shop and conference facilities.

The centre is located on a prominent headland, within the Phillip Island Nature Park, overlooking the largest colony of fur seals in Australia. The site was excised from the reserve to permit a commercial lease to be established over the land. Its development created much controversy, as many were concerned that such a large private development on such a sensitive public land site would restrict access and be an imposition on the landscape.

The construction and operation of the facility was undertaken in a manner that, given its size, has attempted to minimise environmental impact. It is located on a previously much-disturbed site and a lot of the building has been constructed underground, as has the electricity supply and reticulated water supply and sewerage systems installed. The facility, which is surrounded by little penguin nesting habitat, restricts trade and road-access hours to prevent accidental death of penguins.

In addition to its lease rental, the Centre’s management body contributes a proportion of the Centre’s income to the maintenance of the public lands surrounding the Centre. The Centre management also fosters research - it has made the Centre’s video data available to researchers, with post-graduate studies on the seals currently in progress.
The facility employs over 60 people and has annual turnover of $4 million. The entire facility was funded by private sources and built on a ‘build, lease, operate and transfer’ basis (the facilities revert to the State at the expiration of the 50-year lease). It has been designed to manage up to 5,000 visitors a day. In its first year of operation, 1998, it had approximately 170,000 visitors, 90 per cent of whom were from Victoria. It expects numbers to increase and the per cent of international visitors to grow.

Synergies with the Phillip Island Nature Park (and Penguin Parade) are high. The Seal Rock Life Centre is, in effect, a private/public-agency collaboration - the Centre is a commercial business run by a private company with limited shareholding, with the Phillip Island Nature Park Board managing the natural resources upon which it depends - that is the coastal reserve and the seal colony. The Centre management has also entered into a number of cooperative arrangements with the nearby Penguin Parade. These cover parking and shuttle-bus services, and international marketing.

The Committee understands that planning and approval-process issues were of particular concern to the developers and investors of the facility - they were inordinately long and complex, and led to community resistance due to lack of openness during the initial three-year planning and construction period.

**Bookmark Guides**

The Bookmark Guides is a program developed as part of the Bookmark Biosphere Reserve in South Australia. The program was developed as a source of economic activity that met the ESD objectives of the Bookmark Reserve program.

The tour guides operating in the Biosphere Reserve consist of independent businesses, but all have undertaken a rigorous program of training run by the Bookmark Trust - to ensure that the manner of their operation and the message given is compatible with the objectives of the Biosphere Reserve. Each tour is tailored to the particular needs of the client and may cover, for example, the rehabilitation of arid vegetation of former pastoral leases, restoration of wetlands, wetland birds, and the kangaroos. The Committee experienced one such tour while visiting the Bookmark Biosphere Reserve.

**Australis Nature Tours**

This company was established in 1987 and is one of only a few companies in Victoria that exclusively offer native-species-based tours. It offers small-group and private tours to clients interested in seeing and learning about native wildlife in their natural habitat. One of its successful products is an afternoon and evening trip for European visitors to the Serendip Sanctuary and the Brisbane Ranges to see kangaroos, koalas, emus and other birds in their natural surroundings away from crowds. The proprietor of the company has found that even tourists who have travelled throughout Australia regard the first-hand experience of encountering wild animals offered by his company in Victoria as the highlight of their trip to Australia.
The proprietor has found that promotion through overseas tour agents is effective, though expensive.

**Dolphin Research Institute**

The Dolphin Research Institute is a research body that provides information (free of charge) to ecotourism operators on Port Philip Bay, as well as to the Department of Natural Resources and Environment. This information assists tour operators to provide clients with an accurate and overt education message when viewing dolphins and seals. Tourist operators assist the Institute in gathering information on the species they observe. The association provides a marketing edge for the tourist program and ensures that it has minimal impact on the animals.\(^{105}\) It also promotes tourism that is very sensitive to the needs of the target species.\(^{106}\)

**Tour Guides**

In the past few years a new industry sector of regionally based providers of nature-based tours has developed. These providers function as guides, providing interpretation and education. They play a large part in the enjoyment of visitors and protection of the resource – the natural environment.\(^{107}\)

In Victoria a large number of tour operators are listed as members of the Victorian Tour Operators Association.\(^{108}\) Tourism operators consider that native plants and animals are a major reason for most visits to natural areas, otherwise tours “may as well be in the city”.\(^{109}\) All Victorian tour operators listed with the Ecotourism Association of Australia list study and observation of native plants and animals among the features of their products.\(^{110}\) While most would benefit from natural environments to a greater or lesser degree, probably less than a dozen tour operators offer specifically native-species-targeted tours – all of these are small operations employing 10 or fewer staff. Examples, in addition to Australis Nature Tours mentioned above, include:

- a) Australian Koorkaburra Tours - includes Phillip Island and Wilson’s Promontory in its itinerary, specialising in German-speaking tourists;
- b) Early Bird Tours - specialising in tours for bird enthusiasts;
- c) Gippsland High Country Tours - includes a number of ‘ecotours’ in its itineraries - such as short interpretative walks and fauna surveys.

The number of licensed operators is growing at around nine per cent per year.\(^{111}\) A licence is required to operate on public land in Victoria.\(^{112}\) As mentioned earlier in this chapter, Parks Victoria has developed an accreditation policy for commercial tourism operators that has been through the Tourism Accreditation Board of Victoria. More than 50 operators had completed this accreditation program by mid 1998 and consequently were qualified for extended tenure with Parks Victoria.\(^{113}\)
Lodge-based Tours

Another specialised sector of ecotourism activity is that undertaken in association with accommodation lodges. Little Desert Tours Pty Ltd has for many years operated from a lodge on the edge of the Little Desert National Park. It offers bird-watching, wildflower tours, spotlight night walks and photography tours for lodge guests. Gipsy Point Lodge, adjoining the Croajingalong National Park, regularly offers tours for bird watchers and field naturalists.

Tourists as Volunteers

An area of native-species-based tourism that is expanding is voluntary conservation work. Organisations such as the Australian Trust for Conservation Volunteers, EarthWatch (Little Desert restoration) and the Bookmark Biosphere Trust in South Australia are finding that tourists enjoy hands-on experience of conservation work. Activities have included planting of native trees and collection of seed for restoration of habitats, monitoring of wildlife populations and wetland rehabilitation. Participating visitors may pay to take part in these native-species-based activities. An example of ecotourism that incorporates research on native wildlife is the ‘Research Tours’ conducted by the Eco Explorer group in East Gippsland. Participants in these tours gather data on the distribution of fauna that is subsequently submitted for use by government scientists in updating the official Atlas of Victorian Wildlife.

WILDLIFE PARKS AND BOTANIC GARDENS

Zoos, wildlife parks, wildlife sanctuaries, aquaria, and botanic gardens are major tourist attractions. Surveys indicate that almost 50 per cent of overseas tourists visit botanic gardens and parks while in Australia and a similar proportion visit zoos and wildlife sanctuaries. Approximately 60 per cent of visitors from Europe and Britain go to gardens and 62 per cent of Japanese tourists visit zoos and sanctuaries.

As at June 1997, there were 462 individual nature parks, 270 wildlife sanctuaries and 52,164 separate recreational parks and gardens in Australia. These were operated by 684 different private and government organisations.

Such zoos, aquaria and botanic gardens are labour intensive, with a large part of their income spent on wages and salaries. As at June 1997, Australia-wide, they employed 3,075 paid workers and 3,665 volunteers.

Research and education programs are key objectives of many zoos and botanic gardens. Their recreational values are also important for the many visitors who may undertake short stays or long and planned visits - to gain mental and spiritual refreshment.
Though many of Victoria's zoos, wildlife parks and botanic gardens are not specifically dedicated to native species, Australian flora and fauna are an important component of a large number of them.

**Zoos, Wildlife Parks and Wildlife Sanctuaries**

At the end of June 1997 (the most recent statistics available) there were 53 zoos and 12 aquaria in Australia. The zoos and aquaria held 62,467 animal specimens between them, 46,867 of which were vertebrates. Some zoos are also important for their plant collections.

They are also big business - with almost eight million paid admissions and a gross income of some $142 million. Of this income, $69 million came from admissions and $29 million from sale of goods, $26 million came from government and $9 million from donations or sponsorship.

Some zoos and wildlife parks focus on a particular type of animal. The Koala Conservation Centre on Phillip Island is an example of these. While not strictly a zoo or wildlife park, the 'Insectorium of Victoria' in Woodend is another example of an operation based on a particular group of animals.

There is a continuum between the more conventional zoo, in which the animal is held captive, to the 'open zoo' where the animal is free in its natural environment and people are confined. The Wildlife Wonderland in South Gippsland is representative of the former; the Seal Rock Sea Life Centre on Phillip Island an example of the latter. Between these extremes are wildlife parks and sanctuaries that restrict the human visitor to walkways, while allowing the animals free movement within a safe sanctuary that is made as similar to their natural habitat as possible. The Healesville Sanctuary and Earth Sanctuary's Warrawong Sanctuary in the Adelaide Hills, South Australia, are examples.

Wildlife Parks may also be associated with consumptive uses. During its study tour to Zimbabwe, the Committee inspected the Spencer's Creek Crocodile Ranch. While this is primarily a commercial farm - producing crocodiles for skins and meat, it also has a working display/wildlife park facility at a nearby popular tourist area (Victoria Falls) which is run as a tourist venture. Large pens of different-aged crocodiles are kept at the wildlife park. A range of crocodile-skin products are also handcrafted and sold on the premises to tourists.

Location and local support, as well as the quality of the experience offered by zoos and sanctuaries, play a significant part in their success. The Committee were given to understand that location and local support have also served the Phillip Island Nature Park (Penguin Parade and Koala Conservation Centre) well. Warrawong Sanctuary in the Adelaide Hills has similarly gained from being close to a major population centre.
Zoos and wildlife parks are important State-wide and regional tourist drawcards. As noted earlier in this chapter, the Melbourne Zoo attracted more overseas visitors than any other paid-entry destination in Victoria, and the Ballarat Wildlife Park, a private venture, is one of the State’s biggest tourist attractions. Paying visitors not only provide revenue to support the ongoing maintenance of the animal collections and associated research, but contribute to regional tourism.

In Victoria, zoos and sanctuaries are owned and managed by a diversity of individuals and organisations. These include:

- the Zoological Parks and Gardens Board of Victoria;
- Parks Victoria (for example Serendip Sanctuary and Woodlands Historic Park);
- local councils (for example Kyabram Faunal Park);
- not-for-profit, non-government organisations (for example the National Trust);
- private companies (for example the Ballarat Wildlife and Reptile Park); and
- private individuals.

All such animal exhibitions (that is native and exotic animals), wildlife parks (native animals and deer) and zoos (exotic animals) are regulated under the Wildlife Act 1975, as does any other form of display of native fauna. As at June 1999, there were 47 private operators licensed as ‘wildlife displayers’, the licence required for static display in enclosures such as a private wildlife park. An additional 22 people are licensed to display wildlife as part of travelling or temporary displays or as part of demonstrations. Only prescribed native species may be held, and these currently exclude endangered species.

The Zoological Parks and Gardens Board of Victoria

The Zoological Parks and Gardens Board of Victoria (the Board) is a statutory organisation established under the Zoological Parks and Gardens Act 1995. It operates the Royal Melbourne Zoological Gardens in Parkville, the Open Range Zoo at Werribbee and the Sir Colin McKenzie Sanctuary at Healesville.

The Board is part of a global zoo management network, but also provides support to regional zoos and collections. It is a signatory to the World Zoological Conservation Strategy, which has conservation as a central objective. This objective is fulfilled through education and the promotion of “public and political awareness for species conservation”.

An important function of the Board is to ensure the genetic integrity of species, including native species, held in their collections. That is, ensuring that animal populations in zoos and, particularly for rare and endangered species, the world, retain adequate genetic diversity.
A substantial research program underpins the management of its zoo and sanctuary collections as well as assists the management of many other such enterprises in Victoria, and endangered species-recovery programs.\textsuperscript{130}

Species currently encompassed by the species-recovery programs of the Board include the golden sun moth, striped legless lizard, the great barred frog, mountain pygmy-possum, eastern barred bandicoot and brush-tailed rock wallaby. Methods to release captive-bred animals to assist re-establish wild populations have been developed.

Each of the Board’s three facilities offers extensive educational programs.\textsuperscript{131} These are provided for schools, the general public and higher education.

\textit{Melbourne Zoological Gardens and Werribee Open Range Zoo}

The Melbourne Zoo, which opened in 1862, is one of the three most popular tourist destinations for overseas visitors to Victoria, but nonetheless around 70 per cent of its visitors come from Melbourne.\textsuperscript{132} It is not focussed on native fauna, but does contain a significant number of native animals. The Werribee Open Range Zoo features grassland species from around the world, including Australia. An important aspect of this zoo is its commitment to conservation of grasses and other herbs of the Western Basalt Plains. These grassland communities are considered endangered.\textsuperscript{133} As part of its program to promote conservation of native grasslands, the Werribee Zoo has established a native seed orchard. Aims of this include provision of local seed for large-scale replanting and revegetation projects.\textsuperscript{134}

\textit{Healesville Sanctuary}

The Healesville Sanctuary is the most popular native animal sanctuary in Victoria. It was opened in 1934 as a result of the efforts of a few dedicated people whose tenacity overcame the “inertia and bureaucracy” of government.\textsuperscript{135} The substantial involvement of local enthusiasts and voluntary workers enabled the Sanctuary to survive and grow, in spite of official scepticism, scant finance and the constraints imposed by the Second World War. From the vision of the early committees, a Sanctuary with the world’s largest collection of Australian wildlife has evolved.\textsuperscript{136}

Over 200 species are now represented, with interpretation programs offered. The Sanctuary is a major draw-card for both domestic and overseas tourists\textsuperscript{137} - in 1995, 319,542 people passed through the gates.\textsuperscript{138}

Over the years the way that animals are kept at the sanctuary has evolved from formal cage enclosures to ‘walk-throughs’ set among natural vegetation providing habitat for wild populations protected within the fenced sanctuary-compound boundary. A substantive adjoining area, known as the Coranderrk Bushland, consists of fenced remnant bushland, from which visitors are essentially restricted, which is managed to encourage its small mammal population.
The Healesville Sanctuary experience suggests that strong community support, solid research, visionary leadership, an excellent location and openings for local people to be actively involved are a powerful combination where tourist development is concerned.\(^{139}\)

**Koala Conservation Centre**

The Koala Conservation Centre was established to assist in the protection of Phillip Island’s diminishing koala population. The Centre has a captive colony of koalas - stocked with animals that for various reasons would not be able to survive in the wild, as well as a wild population. Both populations are afforded protection from predators by fencing. Extensive plantations of manna gums, swamp gums and blue gums have been established to supplement remnant eucalypt habitat in the vicinity and are used for habitat for the wild population and a source of harvested fodder for the captive animals.

The facilities include elevated board-walks that enable visitors to view animals in a near-natural bushland setting without disturbing them. A visitor centre has been constructed, incorporating displays as well as a gift shop and amenities. The Koala Conservation Centre is part of the Phillip Island Nature Park and current planning is to redevelop the area as a model ecotourism site.\(^{140}\) It attracts approximately 100,000 visitors a year.\(^{141}\)

**Serendip Sanctuary**

Large numbers of native animals can be observed in near-natural conditions at Serendip Sanctuary, Lara.\(^{142}\) It was originally developed as a research station for basalt-plain species and a number of recovery programs were run, such as those for the plains wanderer and the brolga. In recent years it has targeted visitors, with landscaped grounds and an interpretation centre constructed. It aims to be self-funding. Serendip was established on farmland, with natural habitats restored and enhanced to provide an ‘open sanctuary’. In recent times it has provided drought refuge for a free-ranging mob of kangaroos.

**Wildlife Wonderland - Incorporating the Giant Worm**

Wildlife Wonderland is a private wildlife park that was visited by the Committee as part of its inspection program. It provides an interesting example of the development of a wildlife park.

The original tourist development was focussed on one species - the Giant Gippsland Worm. This species grows to 2 metres in length and is the largest earthworm in the world - and its live display proved to be of particular interest to tourists. However, it proved difficult to keep and breed in captivity. Moreover, its wild population status is
precarious - its status under the Flora and Fauna Guarantee Act 1988 was changed from ‘threatened’ to ‘endangered’. As a consequence it cannot now be collected from the wild.

To meet visitor demand and compensate for reduced opportunities to view the giant worms, the centre has expanded the number of species displayed. The wildlife park now includes a wombat display and enclosures with koalas and kangaroos. Given the restrictions of wildlife trading in Victoria, all animals on display were obtained from interstate (Western Australia). The park operates under authority of a wildlife licence and is subject to regular inspections. Ongoing development in recent years has included tea-rooms, a shop and a shark display.

The wildlife park benefits greatly by being on the key access road to the Penguin Parade. It targets the passing bus traffic - and has been successful in doing this, with approximately 270,000 visitors per year.

From discussion with the proprietor of the wildlife park, the key success factors are understood to be good marketing, with access to animals, a good location and collaboration between all tourist facilities in the district. Issues adversely affecting its operations include:

a) complicated regulations;
b) restrictions on handling of koalas;
c) lack of consultation when regulation changes are being considered; and
d) restriction on obtaining animals from animal shelters (where many animals, once they recover, are not suited to release into the wild).

**Warrawong Sanctuary**

Warrawong Sanctuary in the Adelaide Hills is one of six wildlife sanctuaries owned by Earth Sanctuaries Limited. The Committee inspected Warrawong Sanctuary during its study tour to South Australia. The Sanctuary is located on former farmland, which has been replanted to provide feed and shelter for a number of native animals. To date the main focus has been on small ground-dwelling mammals, especially those that are rare or endangered in their natural habitat. Stocks have been obtained from those States that permit trading in native animals. Viable breeding populations have been established.

Warrawong and the other ‘Earth Sanctuaries’ - which now cover a total of 90,000 hectares - offer training, educational and recreational opportunities focussed on attractive native animals. The provision of large feral-free enclosures is considered, by the Managing Director of Earth Sanctuaries, to be the key to ensuring the survival of Australia’s small mammal fauna.

Unlike the public zoos and sanctuaries and most privately owned sanctuaries, Warrawong is financed by a growing number of shareholders. It identifies itself as a
“Conservation company [with] core business [as] conservation”. In particular, it is “committed to saving Australia’s vanishing wildlife ... in the wild, together with the whole ecosystem necessary for its survival”.\textsuperscript{145}

The company expressed interest in developing an ‘Earth Sanctuary’ at the You Yangs Regional Park in Victoria,\textsuperscript{146} however, the then Minister for Conservation and Land Management while welcoming the company’s interest did not support giving the company exclusive access to such a high profile area of public land at no cost and offered to:

Expedite [Earth Sanctuary’s] proposal and facilitate [its] acquisition of private freehold land ... [or lease of] appropriate areas of Crown land.\textsuperscript{147}

The company has now purchased land adjoining the You Yangs Regional Park which it intends to develop as an ‘Earth Sanctuary’. It intends to spend $12 million on the purchase and development of the 1000 hectare site and expects to attract about 110,000 visitors a year.\textsuperscript{148}

**Botanic Gardens**

At June 1997 there were 53 organisations operating botanic gardens, arboreta and herbaria in Australia on 92 separate locations.\textsuperscript{149} The botanic gardens averaged 2,488 living species each, with many more species grown by the largest gardens.

The gardens are supported by ‘friends’ groups and a number of sponsors, but the majority (86 per cent) of financial support (totalling $71 million) is provided by State government funding. Private-sector donations and sponsorship provided $2 million out of the total. Admission charges were made by 16 operators and raised less than $1 million.\textsuperscript{150}

The Royal Botanical Gardens Board, a statutory body established under the Royal Botanic Gardens Act 1991, is responsible for the Royal Botanic Gardens at South Yarra and the Royal Botanic Gardens, Cranbourne. The former was founded in 1846. It contains a total of 10,919 plant species, 2,100 (20 per cent) of which are native to Australia.\textsuperscript{151} It also houses the National Herbarium of Victoria. The Gardens attracted 1.5 million visitors in 1997-98, of whom nearly 30,000 were part of school groups. It is one of the three most popular destinations for overseas visitors to Victoria and a major attraction for local people as well.\textsuperscript{152} It has only a limited collection of plants native to Victoria.

To provide a collection more representative of Victorian flora, the garden at Cranbourne was established, in 1970. It is a protected area of native heathland, low native forest and wetlands, with an arboretum containing representatives of Australia’s diverse flora. This garden is popular with bushwalkers and birdwatchers as well as local picnickers and tourists.\textsuperscript{153} In 1997-98 it was visited by 80,000 people, including 7,570 students and 270 teachers.\textsuperscript{154}
The plant collections are managed for scientific and reference purposes, with the gardens also managed to provide for “education, public enjoyment and tourism”.

**Strengths**

Zoos, wildlife parks and botanic gardens are proven visitor draw-cards. They offer visitors close interaction with wildlife that may foster respect and understanding. Education is generally an integral part of their operation.

The public and larger private operations undertake or subsidise research into native wildlife’s biology and management, and may offer veterinarian and identification services. Community-benefit programs of captive breeding of rare and endangered species for their recovery are undertaken.

They also offer economic benefit to local communities through employment and attracting regional tourism.

**Challenges**

Zoos and wildlife parks involve the maintenance of wild animals in captivity. Though most of the animal population are captive bred, the keeping of animals in captivity is an issue of concern for many.

Zoos and wildlife parks are expensive to run and rely on access to adequate expertise to ensure animal health. Commercial requirements to maintain ‘attractive’ animals or provide for ‘contact’ experience may override objectives such as providing representative collections and meeting animal-welfare needs.

The difference between the public institutions and private parks is becoming increasingly blurred. Both are now commercially driven and the rationale for different regulatory regimes may not be as valid now as it was in the past.

**NATURE STUDY**

The main form of native-species-based recreation is nature study. Native species may also be of interest to those involved in bushwalking and, to a lesser extent, car touring, horse riding and four-wheel driving.

A proportion of those who make use of wild populations of flora and fauna for personal enjoyment and inspiration are members of formal nature study groups.

Of these groups, the Field Naturalists Club of Victoria is the longest standing - it was founded in 1880. It currently has nearly 1,000 members and branches in all regions of Victoria. Most members are actively involved in the field study of particular animals or plants, or seek a more general appreciation of natural history through participation in field trips organised by the Club or their own private endeavours.
The Club also supports an array of specialist groups, including Botany, Faunal Survey, Invertebrate Survey, Marine Research, Microscopical and Fungimap. Members of these groups have contributed substantial information to scientific research and conservation planning, much of which is published in its journal, The Victorian Naturalist. Access and use of wild populations is a necessary prerequisite for much, but not all, such activity.

The Australian Plant Society (formerly the Victorian branch of the Society for Growing Australian Plants) is a non-profit organisation dedicated to the growing, conservation, promotion and appreciation of Australian native plants. It has 28 regional groups as well as a large number of specialist groups interested in specific taxa (for example those specialising in acacia, banksia, boronia, ferns, indigenous orchids), or thematic areas (for example Australian food plants, native-plant regeneration, rainforest and coastal heathland).

The Society has added considerably to the knowledge of how native plants may be used and propagated. It disseminates this information through a regular newsletter, Growing Australian, and Australian Plants Online, an Internet site. An emphasis is placed on horticultural aspects of wildflowers, although excursions and activities also involve use of wild populations.

The study of birds is among the most popular nature-based forms of recreation in Victoria. It has been estimated that 5,000 Victorians pay a subscription to a bird club each year and that many more are involved in bird watching through field naturalist groups. Significant contributions to the Victorian economy arise through sales of binoculars, field guides, books, accommodation, meals and clothing.

Birds Australia has a Victorian membership of 1,270, with groups throughout Victoria and several special-interest groups. It publishes a quarterly journal and is currently updating the Atlas of Australian Birds. The research for the Atlas is being done by amateur bird-watchers. This represents a large contribution by amateur enthusiasts to biological research in Australia.

The Bird Observers Club of Australia has a Victorian membership of approximately 2,000 and branches throughout Victoria. Regular club field trips are a feature of the club’s activities, with natural history reports regularly reported in the club magazine.

Large numbers of ‘friends’ groups and other volunteers contribute to the care and study of natural areas in Victoria. Parks Victoria listed 154 ‘friends’ and volunteer groups in 1997-98. Thirteen of these groups focus on a particular species such as:

a) Eltham copper butterfly;
b) Leadbeaters possum;
c) Mallee fowl; and the
d) eastern barred bandicoot.
These ‘friends’ carry out maintenance and restoration of habitats and an array of research. Examples of such activities are annual surveys of lyrebirds in the Kinglake National Park, surveys of orange-bellied parrots on French Island and the planting of river red gums in Broadmeadows Valley Park.\footnote{161}

The Australian Trust for Conservation Volunteers has for a number of years run programs in which volunteers pay to be involved in regeneration works. Individuals as well as groups take part in research and surveys, such as recording sightings of the regent honeyeater and other rare and endangered species.\footnote{162}

Many other groups are involved in nature-study activities. They include:

a) the Threatened Species Network (a program of the World Wild Fund for Nature);

b) special study groups of the Australian Conservation Foundation and Environment Victoria; and

c) numerous local environment centres and conservation associations.\footnote{163}

Many individuals, of course, undertake nature study without being members of clubs - for enjoyment, inspiration and relaxation. The study of native plants and animals also comes into the curricula of most Victorian schools.

**Strengths and Challenges**

Members of formal nature-study groups not only actively make use of the State’s wild flora and fauna for enjoyment and inspiration, but also make a substantial contribution to the Victorian community through their voluntary research, survey and monitoring work, advice to planning agencies and on-ground restoration activities.

Consumptive activities, such as the taking of specimens, have not been a part of field-trip activities for many years. However, large groups involved in nature-study field trips can have an adverse impact on the natural environment through trampling and creating disturbance to fauna.

**RECREATIONAL FISHING AND HUNTING**

**Recreational Fishing**

Fishing, including both freshwater and marine, is a recreational activity enjoyed by approximately a third of Australians.\footnote{164} In Victoria it has been estimated that 23 per cent of people aged over 14 years fish at least once a year (1996 survey),\footnote{165} of whom just over a half fish in fresh waters. That is, approximately 454,000 people fish for inland species each year.\footnote{166}

The National Institute of Economic and Industry Research undertook an analysis of the economic impact of recreational fishing in 1996-97.\footnote{167} It estimated that more than
$1.037 billion was spent on recreational fishing activities in Victoria in 1996 - or approximately $200 per kilo of fish caught!

Recreational freshwater fishing activity in Victoria is, however, largely focussed on introduced species, notably rainbow trout, brown trout and redfin (or European perch). Many Victorian waterways now have self-sustaining populations of such introduced species, although the fish stock is still maintained artificially in some areas.

There are 27 species of predominantly freshwater native fish found in Victorian watercourses. A number of these native species offer good sport and eating. While the proportion of native fish caught is small relative to introduced species, it is not insignificant. Of those who fish in fresh waters, the Department of Natural Resources and Environment have estimated that approximately 30 per cent would fish for native fish - or about 136,000 people. This represents approximately $180 million gross contribution to the Victorian economy.

Native species sought include:

a) short-finned eel (Anguilla australis);

b) long-finned eel (Anguilla reinhardtii), to a lesser extent that the short-finned eel;

c) common galaxias (Galaxias maculatus);

d) Australian bass (Macquaria colonorum);

e) golden perch (Macquaria ambigua);

f) river blackfish (Gadopsis marmoratus);

g) Murray cod (Macullochella peeli);

h) Macquarie perch (Macquaria australasica);

i) silver perch (Bidyanus bidyanus), also called black bream or silver bream; and

j) Australian grayling (Protocroctes maraena).

Of these, the most sought after are Murray cod and golden perch, which are favoured by 17 per cent and 16 per cent respectively of inland anglers.

The last four species are listed under the Flora and Fauna Guarantee Act 1988 and, in fact, may not be taken.

Crustaceans are also sought. The main edible freshwater native species popularly sought are the spiny freshwater crayfish (Eustacas spp.) and the yabby (Cherax destructor). Freshwater mussels, particularly the widespread Velesunio ambignus, are also sought by some.

The taking of all such species requires a recreational fishery licence under the Fisheries Act 1995, other than for certain categories of person and for the catching of yabbies on lines without hooks. A range of regulations apply, covering closed and open seasons, and bag and size limits vary in line with sustainable-catch criteria for
individual species (these are outlined in Victorian Recreational Fishing Regulations Guide 1998-99).  

A range of government support is provided to recreational fishers. Information is provided through publications such as the Fisheries Notes series, on the biology, distribution, habitat and regulations affecting native species sought by recreational anglers. The State government also operates a fish-stocking program. This program is largely driven by recreational-fishing needs, although in recent times it has also focussed on conservation requirements.

**Fish-stocking Program**
 Both exotic salmonid fish (brown trout, rainbow trout and Chinook salmon) and native species are released by the State government into Victorian watercourses. Somewhat greater emphasis and allocation of resources is given to stocking of the exotic species than native species, albeit less so than in the past.

With respect to release of native fish, Victoria’s policy is contained in Policy Statement – Native Fish Stocking in Public Waters. Fisheries Victoria is responsible for the implementation of this policy. Under the policy, stocking of inland waters is for conservation and recreational purposes. Conditions under which stocking with native fish can occur are specified. These include that:

a) there is a reasonable expectation that the habitat is suitable for survival and growth;

b) the waters concerned are within the known former range of the species, except where special management or research needs arise or exist; and

c) the conservation status of other native fish species or unique faunal assemblages is not put at risk.

Priorities are given to:

*habitability criteria, existing or potential population levels of the species, capacity to monitor the stocking results, and the need of the angling public or conservation status of the species.*

The policy does not address the source of stock, that is whether or not effort should be made to breed stock from local genetic sources, an approach that is desirable if genetic diversity is to be maintained.

Native fish used for stocking of waterways are bred at the government-operated Snobs Creek Hatchery or are purchased from commercial hatcheries such as Native Fish Australia at Bundoora. Native fish are released when they weigh approximately one gram. There are high mortalities from the release of such small fish, but methods to grow them on to a larger size are costly and not well developed.

The native species used in stocking programs are listed in Table 5.3.
Table 5.3 Native fish stocking program  - Fisheries Victoria, 1999

<table>
<thead>
<tr>
<th>Species</th>
<th>Approximate numbers released to Victorian inland waters</th>
</tr>
</thead>
<tbody>
<tr>
<td>Australian bass</td>
<td>10,000</td>
</tr>
<tr>
<td>Golden perch</td>
<td>556,000</td>
</tr>
<tr>
<td>Silver perch</td>
<td>17,000</td>
</tr>
<tr>
<td>Murray cod</td>
<td>133,000</td>
</tr>
<tr>
<td>Trout cod (conservation purposes only)</td>
<td>30,000</td>
</tr>
</tbody>
</table>

Source: Data supplied by the Department of Natural Resources and Environment, Alexandra.

By comparison, 400,000 salmonid (the main group of exotic species used) fingerlings averaging 100 grams each were released in 1996.

**Strengths and Challenges**

A well-established recreational fishing sector makes use of native fish. Interest in such native species for sport is increasing, but is still significantly lower than the level of activity of those targeting exotic freshwater fish.

Angling offers recreation that is accessible to people with widely ranging incomes, and has potential for synergies between recreational uses and both education and conservation. Anglers recognise that for such positive interactions to be maximised, and harmful effects avoided, effective policies and management are needed.

The management of water quality and waterway habitat is vital for recreational fishing activity but beyond the control of fishery managers or participants alone. Unfortunately there is evidence that fish stocks and their habitats are under threat. Poor management of land and waterways and damage to habitats caused by introduced species are major factors in this threat. Predation by, and competition from, introduced species exacerbate the impact of habitat degradation.

The National Policy for Recreational Fishing recognised that funding by State fisheries management agencies is inadequate. In 1993 it was estimated to be approximately half that needed for recreational fisheries management, though Victoria’s new general angling licence will help to alleviate this problem. The National Policy identified priority areas for additional funding as including:

- Research, policy development, community education, resource monitoring, enhancement, enforcement, recreational fisher representation and further development of recreational fishing opportunities.

Efforts are being made to avoid producing imbalance in the native populations by restocking and to obtain stocks from an appropriate gene pool.
The Committee was told, during its Study Tour of western Victoria, that these efforts are, at times, being frustrated by funding limitations which provide pressure to take fish stock from the cheapest source. This is supported by information published by the Department of Natural Resources and Environment.  

Artificial stocking of angling species can help maintain the desired level of fishing pressure. There is, however, a range of issues associated with this. Exotic fish affect native fish through predation, spread of disease, competition, harassment and habitat disturbance. For instance, the Flora and Fauna Guarantee - Scientific Advisory Committee has recommended listing the stocking of fish as a potentially threatening process to the State’s biodiversity, in certain circumstances. The defined threatening process is:

[The] deliberate or accidental introduction of live fish into private waters within a Victorian river catchment in which the taxon to which the fish belong cannot reliably be inferred to have been present prior to the year 1770 AD.

A range of issues was raised in the Federal Government’s Recreational Fishing in Australia, A National Policy. These include:

a) aquatic habitats and ecosystems are the key to healthy fisheries and require protection, restoration and enhancement;
b) recreational fishing needs to be managed as part of the management of the total fisheries resource;
c) governments have a key stewardship and coordination role;
d) the recreational fishing industry should participate in protecting and managing the fish resource;
e) consultation at Federal, State and local levels is needed;
f) recreational fishers are entitled to a share of the fish resource, taking into account long-term sustainable yields;
g) the desirability of recreational fishers adopting a Code of Practice;  
h) programs which seek to increase fishing opportunities should generally be encouraged;
i) the need for programs which encourage a stronger conservation ethic in the community;
j) recreational fishing provides economic, educational, health and other social benefits that should be recognised and promoted;
k) fishing management decisions should be based on sound information including fish biology, fishing activity and catches, and the economic and social values of fishing;
l) adequate funding and support should be provided to manage recreational fishing as part of integrated resource and environmental management; and
m) recreational fishers should continue to meet the costs of sound management.
The Committee notes that in extending the requirement for recreational fishing licences to marine waters, the Government has committed all such additional revenue to fisheries research and management, including the buy out of competing commercial licence access rights.

**Hunting**

The only native species that may be legally hunted in Victoria are those that are defined ‘game’ species and declared ‘pest’ species. Native fauna currently classified as ‘game’ are the stubble quail and eight species of duck. Only one native animal is currently classified as a ‘pest’ species - the dingo (*Canis familiaris dingo*).

Both ‘game’ and ‘pest’ species are excluded from the Inquiry under the Terms of Reference. Several submissions, however, raised the possibility of additional native species being declared ‘game’.

Species suggested as additional game species included wombats and other species currently permitted to be controlled by farmers, as well as the larger species of kangaroos. Currently Queensland is the only State that permits hunting of large kangaroos for sport. The Committee also notes that duck shooting was banned in Western Australia in 1990 and in New South Wales in 1995.

The possibility of linking recreational hunting to pest control or commercial harvesting was also suggested. Some of these submissions claimed that this would offer an alternative way to control excess populations of kangaroos. Pest species suggested as suitable game species were:

- a) galahs, cockatoos and corellas,
- b) ravens (colloquially known as crows),
- c) kangaroos (eastern and western grey kangaroos),
- d) possums; and wombats.

However, an alternative point of view was that hunting would not provide the reduction in numbers desired by pastoralists. Nor did others consider it an effective means of controlling ‘super-abundant’ animals.

Various hunting groups suggested the following other species as good game species:

- a) Japanese snipe;
- b) brown quail;
- c) pigeons (common bronze-wing, crested pigeon, wonga pigeon and the spotted turtle dove);
- d) swans;
- e) purple swamp hen;
- f) freckled duck;
- g) plumed whistling duck; and
- h) the Cape Barren Goose.
The Victorian Game and Deer Stalking Association suggested that hunting would offer incentives to protect habitat and attract tourist dollars.\textsuperscript{206} Representatives of peak hunting clubs supported the claim that hunting of kangaroos would attract overseas tourists, especially if trophies could be taken out of Australia.\textsuperscript{207} However, from the point of view of ecotourism, the National Ecotourism Accreditation Program considers that hunting or any other form of intrusion into native faunal populations would not meet ecotourism accreditation guidelines.\textsuperscript{208}

The claims that hunting has considerable potential to further wildlife conservation through habitat protection and restoration, and the fostering of a conservation ethic are supported by the Senate Report, several submissions and information provided to the Committee during its study tour to Zimbabwe.\textsuperscript{209}

In the past a percentage of the Victorian game-hunting licence fees were used to purchase wetlands for inclusion in the State Game Reserve system.\textsuperscript{210}

The Committee observed the benefits of hunting as a source of income and incentive for conservation during its study tour of Zimbabwe, but acknowledges that conditions in that country are very different from those in Victoria.\textsuperscript{211} Certainly the income derived from the lucrative big-game-hunting industry is proving a strong incentive to local communities to protect the animals both through reducing poaching and habitat protection. It is also providing much-needed income to people who are otherwise in very poor circumstances. On the other hand, in Kenya, where a similar style of tourism industry has been managed in a different manner, such tourism has not ensured the protection of habitats.\textsuperscript{212}

The Committee was also informed of an approach to hunting that has recently been developed in Tasmania,\textsuperscript{213} which uses ‘Property Based Game Management Plans’. A similar approach has recently been adopted by landholders and government agencies in western New South Wales. The game-management plan approach provides for individual hunters to contract with landholders for access and hunting rights to game species (mainly feral pigs and goats). Hunters may remove these animals, and in the New South Wales approach, must also shoot kangaroos on a kill-and-let-lie basis and destroy feral pests as well as game species. Landholders can charge a fee for hunting.

In addition to providing hunting opportunities, the reduction of native animals and pest species population can benefit habitat. Further details are provided in Chapter 10.

\textit{Strengths and Challenges}

There is interest by some hunting groups to increase the number of native species that it is permissible to hunt. The species sought are mostly those that may be killed by farmers as part of control programs. Some consider hunting as an important draw-
card for tourists. Property-based Wildlife Management Plans may enable recreational hunters access to animals, while meeting the needs of landholders.

A number of groups and individuals did not support any additional native species being made available for recreational hunting and, indeed, advocated the further restriction of species currently available to recreational hunting. Others raised a concern that consumptive uses of wildlife would reduce the attractiveness of Victoria as a tourist destination to visitors.

There is a potential conflict between hunting and ecotourism where the same locality is sought for both. According to the Coalition Against Duck Shooting, wetland tourism is providing a substantial boost to several rural economies and could expand considerably. Examples provided are:

Kerang, Boort and Donald ... prime examples of towns that have the potential to become major tourist centres for international visitors.

The presence of hunting in these wetlands may detract considerably from this development.

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7 Bureau of Tourism Research data analysed by Campbell Gome, C., Market Analyst, Tourism Victoria, personal communication, 16 August 1999.
12 Bureau of Tourism Research data analysed by Campbell Gome, C. Market Analyst, Tourism Victoria, personal communication, 16 August 1999.
15 ibid., p. 9.
23 For example:
Moore, E., Chair, Birds Australia Conservation Committee, *Written Submissions*, No. U30,
Wilson, J., Conservation Coordinator, The Field Naturalists Club of Victoria Inc., *Written Submissions*, No. U66, and
Weir, Director, Dolphin Research Institute Inc, *Written Submissions*, No. U68.

Some considered that tourism could make a vastly greater contribution to the Victorian economy than at present. Their claims were based on an appreciation of the resource rather than any information on demand.

Ray Leivers, Manager of Phillip Island activities for Parks Victoria - personal communication, 18 March 1999.
26 *ibid.*, p. 48; and also
Leivers, R., Manager of Phillip Island activities for Parks Victoria - personal communication, 18 March 1999.
The Melbourne Zoo, and the Art Gallery are the most popular fee-for-entry attractions.
28 Burns, G., Marketing Manager, Phillip Island Activities for Parks Victoria, quoting data provided by KPMG consultants.
30 *ibid.*, p. 5; and also
36 Average number of overseas visitors to the Grampians National Park in 1992 was 41,300 and the annual growth rate of overseas visits was predicted to be 4 per cent - Fox, W., Manager, Industry Strategies Tourism Victoria, personal communication, 24 May 1999; and also
The 4 per cent growth rate gives an estimate of overseas visitors in 1999 as 54,300.


39 Earth Sanctuaries Ltd, Written Submissions, No U11.


Claims that 20-25 per cent of leisure travel has elements of ecotourism, but the authors consider that many operators use ‘eco’ for marketing, with little concern for its meaning.

41 Commonwealth Department of Tourism (1993), Draft National Ecotourism Strategy, November 1993,

42 Commonwealth Government Printer, Canberra, ACT, p. 3; and also


44 ibid., p. 4.

45 ibid., pp. 38, 40 53 and 89.

46 An example of its publications is the Australian Ecotourism Guide (1996).

47 Commonwealth Department of Tourism (1993), Draft National Ecotourism Strategy, November 1993,

48 Commonwealth Government Printer, Canberra, ACT, p. 11; and also


51 Hundloe, T., Environmental Management Centre, University of Queensland and Chairperson of the National Ecotourism Accreditation Program; personal communication, 15 June, 1999.

52 Hundloe, T., Chairperson of the National Ecotourism Accreditation Program and Charters, A., Director of Planning and Destination Development, Tourism Queensland, personal communications, 11 June 1999.


57 Hundloe, T., Chairperson of the National Ecotourism Accreditation Program and Mr Tony Charters, Director of Planning and Destination Development, Tourism Queensland, personal communications, 11 June 1999.

58 Fox, W., Manager Industry Strategies, Tourism Victoria personal communication, 24 June 1999.


60 Parks Victoria (1997/98), Parks Victoria Annual Report 1997/98, Parks Victoria, Melbourne, Victoria, p. 10; and also


63 ibid., pp. 12, 16.
65 ibid., ACT, p. 24.
66 ibid., p. 25.
78 ibid., p. 65.
81 ibid., p. 65.
82 ibid., p. 65.
83 ibid., p. 65.
87 ibid., p. 65.
88 ibid., p. 65.
89 ibid., p. 65.
90 ibid., p. 65.
91 ibid., p. 65.
92 ibid., p. 65.
93 ibid., p. 65.
94 ibid., p. 65.
95 ibid., p. 65.
96 ibid., p. 65.
97 ibid., p. 65.
98 ibid., p. 65.
99 ibid., p. 65.
100 ibid., p. 65.
101 ibid., p. 65.
102 ibid., p. 65.
103 ibid., p. 65.
104 ibid., p. 65.
105 ibid., p. 65.
106 ibid., p. 65.
107 ibid., p. 65.
108 ibid., p. 65.
109 ibid., p. 65.
110 ibid., p. 65.
111 ibid., p. 65.
Herath, G. (1995), Ecotourism Development in Australia, School of Economics and Commerce, La Trobe University, Discussion Paper, La Trobe University, Bundoora Victoria, pp. 4 - 8.  
95 ibid., p. 47.  
96 The penguin ‘hospital’ was established principally to rehabilitate oil spill-affected penguins. It costs approx. $70,000 per year to run.  
98 Including ESSO, BHP Petroleum, the BHP Community Trust, Cadbury-Schweppes and others.  
99 For instance, it is now known that the main impacts of humans on penguins and koalas are damage caused by foxes, cats, dogs, oil spills (mainly from fishing boats and ballast pumping), road traffic and damage to food resources (pilchards and anchovies). Consequently, damage control strategies are being developed and implemented, such as baiting programs that have now largely eliminated foxes and modified access has reduced road kills.  
101 These real-time images are beamed by laser to a large viewing auditorium and can be aimed at any particular desired aspect of the colony.  
102 Covering rock-pool life, shearwater and albatross migration and, in particular, seal utilisation in the past, their ecology, predators (sharks) and research.  
103 Seal Rocks Victoria Australia Pty Ltd (1998), Seal Rocks Phillip Island Tourism for Tomorrow, submission to British Airways Tourism for Tomorrow Awards, unpublished.  
105 Dolphin Research Institute Inc, Written Submissions, No U68.  
106 Dunn, W., Research Officer, Dolphin Research Institute, Frankston personal communication, 16 August 1999.  


116 ibid., p. 37.


119 ibid., pp. 5, 11.

120 Walsh, W., Senior Botanist, Royal Botanical Gardens, South Yarra, Victoria; personal communication, 13 July 1999.


124 The Woodland Historic Park includes the ‘Back Paddock’, which was fenced in 1987 as a faunal reserve to protect native wildlife from exotic predators. The endangered eastern barred bandicoot has been reintroduced here and has formed a breeding colony which is playing a major role in securing the species’ future – Parks Victoria (1999), Woodland Historic Park, Internet site: http://www.parks.vic.gov.au/cgi-bin/parks/w3-msql/parks/parks.html?parkId=33, 14 July 1999.

125 There are a number of exceptions under the legislation, the most notable being zoological parks under the Zoological Parks and Gardens Act 1995.

126 Data provided by the Wildlife Licensing Section, Department of Natural Resources and Environment, 17.6.1999.


129 Slater, G., Zoological Parks and Gardens Board of Victoria; personal communication, 14 July 1999.


132 Walker, G., Director marketing and Visitor Services, Zoological Parks and Gardens Board of Victoria; personal communication, 14 July 1999.


136 Tourism Victoria (1999), Internet site http://www.tourism.vic.gov.au/attractions/keyattr.htm 1.6.1999, p. 1; and also:


ibid., pp. 113-125 - early funding was meagre in the extreme. Some was used to pay an army of local youngsters to gather food for the animals in the Sanctuary. This helped to engage the long-term interest of local people. So too did the need to involve local volunteers in building.


ibid., p. 33.

Lee, A., President, Tourism Operators Association of Victoria (and also Australis Tours); personal communication, 13 July 1999.


ibid., p. 20.


The Herald-Sun, 14 January, 2000; p. 5


ibid., p. 11.

Walsh, N., Senior Botanist, Royal Botanical Gardens Melbourne; personal communication, 13 July 1999.


ibid., pp. 16-17.

Data supplied by staff of the Royal Botanical Gardens Melbourne, 14.7.1999.


Moore, E., Chair, Birds Australia Conservation Committee, *Written Submissions*, No. U30

ibid.


A pamphlet prepared by the (former) Department of Conservation and Natural Resources is available through outlets such as the National Parks Association as well as Parks Victoria. This provides information on the Regent Honeyeater and a form on which sighting information can be recorded.

Information provided by the National Parks Association, 10 Parliament Place, East Melbourne, 3001, 18 June 1999.

National Recreational Fisheries Working Group (1994)*Recreational Fishing in Australia, a National Policy*. National Steering Committee on Recreational Fishing, Department of Primary Industry and Energy, Canberra, ACT.


The fish stock elsewhere is maintained by artificial stocking.


172 Derived from Lake, J.S. (1978), Australian Freshwater Fishes, Thomas Nelson Australia Pty Ltd, Australia; and also
Department of Natural Resources and Environment, Written Submissions, No. U67.
175 Department of Natural Resources and Environment (1998/99), Victorian Recreational Fishing Regulations Guide 1998-99, Department of Natural Resources and Environment, Melbourne, Victoria, pp. 6-7.
176 ibid.
177 Published by Fisheries Victoria.
179 Department of Natural Resources and Environment (1998) Salmonid Fish releases 1998, Fisheries Notes Series No FN0005February 1999, 145, ISSN 1440-2254 and also
Department of Natural Resources and Environment (1998), Native Fish Releases 1993/94 to 1997/98, Fisheries Notes June 1998, 144.
182 Status of taxa may be ‘endangered’, ‘vulnerable’, ‘potentially threatened’, ‘indeterminate’ or ‘restricted’. Each of these categories indicates a reduction in populations of the species or other reasons for considering it to be at risk. ‘Endangered’ species are at immediate risk of extinction.
184 Compared with trout and salmon, which are released at 100-150 grams.
189 For example, Department of Conservation and Natural Resources (1998), Freshwater Fish of Victoria – Grayling, Fisheries Notes Series No FN0055; Department of Conservation and Natural Resources (1998), and also Freshwater Fish of Victoria – Golden Perch, Fisheries Notes Series No FN0051;
Department of Conservation and Natural Resources (1998), Freshwater Fish of Victoria – Trout Cod, Fisheries Notes Series No FN0048.
190 National Recreational Fisheries Working Group (1994) Recreational Fishing in Australia, a National Policy.
National Steering Committee on Recreational Fishing, Department of Primary Industry and Energy, Canberra, ACT, pp. 4-5, 8-9.
191 ibid., pp. 24-25.
192 ibid., p. 24.
193 Baxter, A. and Winstanley, R. (1999) Fisheries Management Report No 63: 1999 Consultation with NRE Regions on Fish Stocking, Fish Population Surveys and other Recreational Fisheries Management Issues. Department of Natural Resources and Environment, Box Hill, Victoria, pp. 6, 10. Request to restocking with golden perch was refused on the grounds that it would out-compete trout cod.
196 National Recreational Fisheries Working Group (1994), *Recreational Fishing in Australia, a National Policy*. National Steering Committee on Recreational Fishing, Department of Primary Industry and Energy, Canberra, ACT. This could be somewhat more difficult than for other activities where participants are usually associated with a club or association. That is not so common with recreational fishing.

197 VRFish, *Written Submissions*, No. U10, and also

198 This could be somewhat more difficult than for other activities where participants are usually associated with a club or association. That is not so common with recreational fishing.


200 Page, R., Executive Officer, VRFish, *Written Submissions*, No. U10, and also


206 Victorian Game and Deer Stalking Association (VICGAME), *Written Submissions*, No. U47.

207 Australian Taxidermists Association, *Written Submissions*, No. U37; and also:

208 Hundloe, T., Chairperson of the National Ecotourism Accreditation Program and Charter, A., Director of Planning and Destination Development, Tourism Queensland, personal communications, 11 June 1999

209 Examples of submissions which advocate this notion are:
Victorian Game and Deer Stalking Association (VICGAME), *Written Submissions*, No. U47, and
Drew, R., Executive Officer, Victorian Field and Game Association Inc., *Written Submissions*, No. U41.

210 The reserve system now includes some 173 reserves, covering 32,000 hectares of land.

211 This point is also made in Bolton, M. ed.(1997), *Conservation and the Use of Wildlife Resources*, Chapman & Hall, London, UK, pp. 18-19, 235


214 For example, Safari Club International, *Written Submissions*, No U39, and also:
Victorian Game and Deer Stalking Association of Australia, *Written Submissions*, No. U47.

215 For example
Barber, P., State Director, Royal Society for Prevention of Cruelty to Animals, *Written Submissions*, No. U17,
Cowling, Y., *Written Submissions*, No. U22,
Wallis, H., *Written Submissions*, No. U48

216 Levy, L. Coalition Against Duck Hunting, *Written Submissions*, No. U53, and


218 ibid.

219 ibid.
CHAPTER 6
OTHER SECTORS

• INTRODUCTION
• SUBSISTENCE AND CULTURAL USE BY ABORIGINAL COMMUNITIES
• COMMERCIAL ACTIVITY
• PETS AND COMPANION ANIMALS
• AMATEUR COLLECTORS AND ENTHUSIASTS
• WILDLIFE SHELTERS
• OUTDOOR EDUCATION
• ART, BOOKS AND FILMS

INTRODUCTION

In the previous chapters the Committee has outlined the three major areas of utilisation - commercial utilisation of plants (especially wildflowers and bushfoods), animal product industries (particularly emu, kangaroo and aquaculture) and ecotourism and recreational activity.

The Committee is also aware that there is an array of other sectors. Some are relatively minor in terms of the number of people involved or their economic outputs, but they are nonetheless important to the participants involved. Many may also have potential for growth and wider application.

These other sectors of utilisation include:

a) subsistence and cultural use by Aboriginal communities
b) commercial activity
   i) microbiota
   ii) venom supplies
   iii) taxidermy
   iv) live-animal trade - wholesale
   v) pet and aquarium trade - retail
c) pets and companion animals
d) amateur collectors and enthusiasts
   i) aviculture (birds)
   ii) reptiles and amphibians
   iii) mammals
e) wildlife shelters
f) outdoor education and
g) art, films and books.

SUBSISTENCE AND CULTURAL USE BY ABORIGINAL COMMUNITIES

The use of native plants and animals is of great importance to Aboriginal communities within Victoria.

Foraging activities and the traditional methods of dividing and sharing gathered resources are important to the social cohesion of communities. The incorporation of new forms of (Western) technology has not diminished the cultural significance of such activities for Aboriginal communities. Nor has the presence and use of new animal species, that is introduced feral animals, affected the cultural tradition.¹

While much traditional knowledge has been lost, Victoria’s Aboriginal communities give strong emphasis to the maintenance and re-establishment of their cultural traditions. Knowledge of traditional foods and crafts may now rely on fragments of information retained by elders or that obtained from field research by archaeologists and palaeobotanists and literature research by historians.

Members of many Victorian Aboriginal communities do, at times, still use native plants and animals - for food and raw materials. Fishing is undertaken for both personal and family use using traditional techniques supplemented with modern technology. Coastal communities have commented that “traditional techniques are not as successful now as there are fewer fish and may also be restricted by management requirements”.²

Nevertheless, as a result of 200 years of cultural and environmental change, the dependence on such subsistence activity is no longer an economic necessity, nor practical. The opportunity to derive economic benefit from native flora and fauna is, however, real and there is a desire by contemporary Aboriginal communities to take advantage of these opportunities.

Moreover, Aboriginal communities are gaining increasing legal rights to access land and wildlife resources - the Commonwealth Native Title Act 1993 “specifically recognises indigenous property rights in indigenous species”.³ Such rights remain, albeit modified by more recent legislative change.

Historical Use

The indigenous people of Australia successfully depended on native plants and animals for both survival and life-style for more than 40,000 years. This successful dependence on the land for so many thousands of years, through climatic and geological upheavals, must be regarded as sustainable use of the natural resources. All
people participated in providing the group with its necessary resources. Traditionally, in Australia's temperate south-east, sources of food were diverse and available all year round. It was neither necessary nor acceptable to take more than was required to meet present needs.\(^4\)

In some areas, such as along the Murray, the natural resources supported a semi-settled lifestyle - such communities depended on the abundant wildlife that lived near the water and the aquatic species in the waterways.\(^5\)

**Use of Plants**
“Aboriginal people were omnivorous, deriving their diet from a wide range of uncultivated plant foods and wild animals”.\(^6\) Their diet included tuberous roots, seeds, fruits, nuts, gums and nectar. “When the first Europeans arrived [in Victoria] they found a well-nourished people, showing that the Koorie had achieved a balance between exploitation and renewal of the resources of the land”.\(^7\) Examples of major Koori food plants are provided in Table 6.1.

**Table 6.1 Examples of Aboriginal food plants in Victoria**

<table>
<thead>
<tr>
<th>Traditional name</th>
<th>Common name</th>
<th>Species</th>
<th>Use</th>
</tr>
</thead>
<tbody>
<tr>
<td>Murrong</td>
<td>Yam</td>
<td><em>Microseris lanceolata</em></td>
<td>Tuber - staple food</td>
</tr>
<tr>
<td>Cumbungi</td>
<td>Bull rush</td>
<td><em>Typha spp.</em></td>
<td>New shoots and rhizomes – major source of carbohydrate and ‘greens’; fibre</td>
</tr>
<tr>
<td>Djarg</td>
<td>Common reed</td>
<td><em>Phragmites australis</em></td>
<td>Roots – ‘greens’; stems – decorations and spear shafts</td>
</tr>
<tr>
<td>Ngarelior</td>
<td>Water ribbon</td>
<td><em>Triglochin procera</em></td>
<td>Tuber – staple food</td>
</tr>
<tr>
<td>Woorpert</td>
<td>Marsh club-rush</td>
<td><em>Bolboschoenus medianus</em></td>
<td>Corm – carbohydrate source</td>
</tr>
<tr>
<td>Nal-a-wort</td>
<td>Coastal wattle</td>
<td><em>Acacia sophora</em> (and other <em>Acacias</em>)</td>
<td>Seed – protein-rich food</td>
</tr>
<tr>
<td>(not known)</td>
<td>New Zealand and Bower spinach</td>
<td><em>Tetragonia spp.</em></td>
<td>Leaves – ‘greens’</td>
</tr>
<tr>
<td>(not known)</td>
<td>Quandong</td>
<td><em>Santalum acuminatum</em></td>
<td>Fruit eaten; also seeds</td>
</tr>
<tr>
<td>(not known)</td>
<td>Native flax</td>
<td><em>Linum marginale</em></td>
<td>Seed as food; stem used for fibre</td>
</tr>
<tr>
<td>(not known)</td>
<td>Common purslane</td>
<td><em>Portulaca oleracea</em></td>
<td>Leaves and seed eaten</td>
</tr>
<tr>
<td>(various)</td>
<td></td>
<td><em>Panicum spp.</em></td>
<td>Seeds eaten</td>
</tr>
<tr>
<td>(various)</td>
<td></td>
<td><em>Persoonia spp.</em></td>
<td>Fruit and possibly seed eaten</td>
</tr>
<tr>
<td>(various)</td>
<td></td>
<td><em>Acacia spp.</em></td>
<td>Gum and seed eaten; bark for medicines</td>
</tr>
</tbody>
</table>

Source: Gott (1985), Gott (1997) and Zola and Gott (1993).\(^8\)
Aboriginal people’s use of native plants was not restricted to foods. Plants were also used for a wide array of other purposes. These include:

1. fibres;
2. medicines;
3. implements; and
4. resins.

Fibres were used for purposes ranging from fine weaving to strong rope, using material from, for example, poison pimelia and bootlace bush (Pimelia spp). Traditional Aboriginal society used many native plants for medicinal purposes, for example an infusion made from Ajuga australis to bathe wounds and boils. Other extracts were used as inhalants for respiratory problems, as disinfectants, poultices or treatments for gastric disorders. Medicines were obtained from many species, including the bark of wattles.

A wide array of species was used to create implements, with resins obtained from, for example, native cypress pines (Callitris spp.) and porcupine grass (Triodia irritans). Other more specialised uses included waterproofing, using material obtained from plants such as silver wattle (Acacia dealbata).

**Use of Animals**

Mammals, birds, reptiles, fish, shellfish, and indeed most types of animals, were used for food, as well as animal parts such as bone, sinews and oils being used for a variety of purposes. Species used include the platypus (Ornithorhinchus anatinus), common wombat (Vombatus ursinus), common brushtail possum (Trichosurus vulpecula), red-necked wallaby (Macropus rufogriseus), emu (Dromaius novaehollandiae), yabbies (Cherax spp.), witjuti (witchety) grub (Xyleutes spp.), termites (Order Isoptera), cicadas (Family cicadidae).

A number of freshwater mussels (particularly Velesunio ambiguus) were used, especially along the Murray River, for food and utensils.

**Commercial Use of Wildlife**

In addition to subsistence and cultural uses, Aboriginal communities are increasingly interested in the commercial opportunities that native flora and fauna may offer.

There is very little commercial use made of native flora and fauna in Victoria. In other States, examples of such use include mutton-birding (in Tasmania), the harvesting of crocodile eggs and young for ranching operations (Northern Territory), and the harvesting of bushfoods for supply to food processors (Northern Territory). Such activities offer one of the few opportunities for traditional hunter-gather skills and knowledge to be used for economic (cash income) advantage.
While use of native flora and fauna has traditionally been consumptive, ecotourism-style activity is being pursued by a number of Aboriginal communities in Victoria. The Committee visited the Brambuk Living Cultural Centre on the edge of the Grampians/Gariwerd National Park. It inspected a garden of plants traditionally used for food, medicine and tools by the five Aboriginal communities that operate the centre. A bushfood menu is offered in the Centre's café - the first bushfood restaurant in Victoria. Because of restrictions on wild-harvest in Victoria, food for the café is obtained from South Australia (kangaroo, fruits and berries), Western Australia (emu), and the Northern Territory (fruits and berries). Some fruits and berries and wattle seeds are, however, obtained from local sources.

**Strengths and Challenges**

Today there is an increasing interest in Aboriginal history and culture, by non-Aboriginal as well as by Aboriginal communities.

Traditional Aboriginal methods of using the land in Victoria, and the nomadic lifestyle, were not without impact, but were essentially sustainable and by and large avoided the creation of problems such as soil erosion, salinity, river pollution, depleted fishing stocks and impoverished ecosystems. Clearly traditional methods of obtaining food and fibre cannot support Victoria's current population, but there are still lessons to be learnt from the Aboriginal approach to the land.

Unfortunately the disruption of traditional ways of living has prevented the handing down of much of the knowledge acquired over millennia concerning the use of native species. This makes the preservation of the information that remains all the more important. It is on the store of Aboriginal knowledge that much of the emerging bushfood industry is based. Traditional information is a first source of knowledge concerning many other potential uses and management of native species. It can also play a valuable role in the maintenance of Aboriginal culture and reconciliation between traditional and Western cultures.

Aboriginal use of wildlife for subsistence as well as commercial harvesting could facilitate the economic independence of Aboriginal communities, as could income from involvement in conservation and land management programs and ecotourism-style activity. The recognition of traditional access rights - without need for permits - and direct involvement in land and resource management and decision-making, are priority issues for Victorian Aboriginal communities.

**COMMERCIAL ACTIVITY**

**Microbiota**

Emphasis is often given to the flora and fauna that are visible to humans - the vascular plants (ferns, gymnosperms and flowering plants), the larger non-vascular plants
(liverworts, mosses and some groups of algae), vertebrates (fish, amphibians, reptiles, birds and mammals), arthropods (such as spiders and insects), worms, molluscs, and echinoderms (such as star fish). The State's microscopic biota - algae, protozoa, fungi and bacteria, while often less recognised, are vital to the functioning of natural ecosystems. They are intimately associated with nutrient transfer and energy flows.

Microbiota include prokaryotic organisms (bacteria and the very small, single-celled blue-green alga) and eukaryotic organisms (other single-celled biota or biota without differentiated tissue cells) such as protozoa and fungi.

Such species largely make up the plankton and phytoplankton from water bodies, and are important components of soil biota. They are very different from more complex forms of living organism and are thus of special interest to researchers and have a significant role to play in an array of utilisation activities.

The potential of complex organic chemicals produced by the vast array of microorganisms is investigated through processes termed 'bioprospecting'. As was outlined in Chapter 3, there are two main companies undertaking such bioprospecting in Australia, one of which is in Melbourne. Micro-organisms, as well as plants, from around Australia and South-east Asia are screened through a range of high-tech bioprospecting methods.

Microbiota are currently used for:
  a) chemicals in pharmaceuticals;
  b) new enzymes and genetic material for agricultural and medical use;
  c) bioremediation of polluted habitats;
  d) biological control of weeds and pest animals;\(^{22}\) and
  e) recycling of natural and waste materials.\(^ {23}\)

The potential expansion of such uses and their value is great. An example of such potential is a newly discovered micro-organism reported in the press early in June 1999.\(^ {24}\) The micro-organism was discovered, by a CSIRO researcher, in a herbicide-polluted site in Western Australia. It is a new strain of a common soil organism, Pseudomonas. According to the press reports, the organism has three unique genes that enable it to digest a highly toxic and soil-persistent pesticide (atrazine, and possibly others) that is used widely in agriculture. This ability has wide application to dealing with spills and residues in contaminated soil and ground water. Atrazine is used around the world and the discovery has worldwide application.

Some of the fungi with large fruiting bodies, for example mushrooms, are also wild-harvested or cultivated for use as food. Many of Victoria's indigenous fungi are cosmopolitan species, that is they are found naturally around the world. These include the common field mushroom and the 'champignon' mushroom, both of which are
edible. Many of the indigenous fungi that are found only in Australia are also edible or have pharmacological properties of potentially commercial application.

**Sector Challenges**

AMRAD Discovery Technologies raised a lack of awareness of the potential of microbial resources as an issue of importance. This company is concerned that potential microbial resources could be destroyed, as habitats are lost. It pointed out the paucity of taxonomic information available, the likely high number of endemic Australian biota, and the prospect of genetic resources being transferred elsewhere, including via soil and plant samples taken out of Australia.

Difficulties of regulation of microbial use were also raised by AMRAD. Such difficulties may arise both because the position with regards ownership of genetic material is unclear and because of the lack of basic taxonomic knowledge about Australian microbiota.

**Venom Supplies**

The venom supply industry is a small but important sector. It is dominated by two businesses - Venom Supplies Pty Ltd (based in South Australia) and the Australian Reptile Park (based in Queensland).

The sector produces venom and various venom fractions (such as neurotoxins and anticoagulants), as well as antibodies for use against these purified toxins. Venom is used for antivenom production and medical research and diagnostics. Blood serum and purified toxins are used for biochemical research and production of antibodies.

The venom is extracted from captive stock of reptiles and spiders. Venom Supplies Pty Ltd obtains its reptiles and spiders from both captive-bred and wild-captured animals:

Venom Supplies Pty Ltd keeps about 300 snakes at any one time and while some species are economic to breed, others and in particular brown snakes (Pseudonaja spp.) are impracticable to breed but are easily sourced from the wild.

On occasions animals obtained in Victoria are acquired for purposes such as venom-yield research.

The major producer of antivenom for Australian poisonous animals is CSL Limited, a Melbourne-based national pharmaceutical company. CSL Ltd produces species-specific antivenom for a number of venomous snakes and spiders, as well as for ticks, the box jellyfish, and stonefish. Polyvalent antivenom, for all Australian and Papua New Guinean snakes, is also produced (released in 1992). The Company produced the first commercial antivenom in 1930 (for tiger-snake poisoning).
Sector Strengths and Challenges
The industry is vital to the production of antivenoms and thus the well-being of Australians. Research into improved and new types of antivenom has been successful and is ongoing.

Access to animals for venom supply is a continuing need, but time consuming, even for quite common species.

As a national industry, the level of regulation covering the import and export of animals and products across State borders is said by those involved to be exasperating. An example provided by Venom Supplies Pty Ltd of the time that was taken to acquire a common species (caught in urban backyards) from a licensed snake catcher for use in research is indicative of the industry’s concerns:

We wanted to acquire 10 tiger snakes ... so we could carry out venom yield studies with this species. This information is used for calculating the antivenom vial size, which is critical in any snakebite treatment. ... I applied to the Victorian authority on 23 October 1998. [After] numerous e-mails ... [and] telephone calls ... the permit was finally issued on the 5th February, nearly four months later.  

The level of regulation and the more recent requirement of some States for royalty agreements are, according to Venom Supplies Pty Ltd, the two major impediments facing the sector.

Taxidermy
There are 23 licensed taxidermists operating in Victoria, most of whom conduct owner/operator businesses. A number employ licensed assistants.

A large part of their business is the mounting of game species for individuals to use as display items. Such game species include native waterbirds and, to a lesser extent, quail. Game birds make up approximately a third of the total number of animals mounted by two of Melbourne’s larger taxidermy businesses. Specimens and skins of native species, such as fish, pest animals and birds, and animals from fauna parks are also processed.

Private owners of prepared or mounted specimens of native fauna require a licence under the Wildlife Act 1975 to process animals, other than game birds, deer and a small number of common birds, frogs and reptiles.

Issues
Hunters travel around the world in pursuit of hunting opportunities and a significant percentage of such hunters seek to retain some form of trophy, usually a skin or mounted specimen, prepared by a taxidermist. There are some 80 species of game waterbird in the world and mounted specimens of each are sought for collections.
While specimens can be mounted in Victoria, unlike New Zealand, the USA, and South American and African countries, these cannot be exported to an overseas hunter's home country. This is because Victoria does not have a management program in place that has been approved under the Commonwealth legislation governing the export of native animals and their products. The Australian Taxidermists Association argues that the export of sport-hunted game trophies is an effective utilisation practice and should be permitted.

**Live-animal Trade - Wholesale**

With three exceptions, the harvesting of native animals from the wild is not permitted in Victoria. The exceptions are galahs, cockatoos and long-billed corellas. These may be harvested and sold by a small number of licensed 'commercial wildlife controllers'. Consequently, the commercial live-animal trade sector consists primarily of breeders and traders.

The domestic market supports a small number of commercial breeders of captive-bred native birds and reptiles. The breeding of birds is a long-established industry; the breeding of reptiles is an emerging industry.

Australian birds are bred overseas - in the United Kingdom (parrots), New Zealand (galahs), and Tanzania (galahs) - for the international market. Long-neck tortoises are also bred overseas. Under current export laws, the export of live birds and, indeed, any animal from Australia is very much restricted.

The international market for live animals is huge - most international live-animal trade is in fish (500-600 million), followed by reptiles (5 million), birds (2 million) and primates, that is monkeys (25,000-30,000). A large proportion are captive-bred but wild-harvesting still occurs in many countries for many species. Given that the market value in overseas markets is generally higher than that in Australia, the potential for an export market is large (and actively sought by many, but not all, in the industry).

**Sector Opportunities and Challenges**

There is an established commercial avicultural industry in Victoria (albeit much smaller than, for example, Western Australia). The domestic market has been suffering over-production and prices have been falling, but the potential export market is large. Australian breeders have access to unique genetic resources, have high avian health standards and can produce in more spacious enclosures in the natural conditions than overseas competitors.

Existing export restrictions and public opposition to changing these restrictions due to concern about exploiting native animals, welfare aspects of transporting animals, and potential impacts on endangered species, are constraints for the sector.
Pet and Aquarium Trade - Retail

Any pet shop may sell a limited range of defined species of captive-bred native wildlife, without need for a special licence or record keeping. The defined species are the king quail (Coturnix chinensis), budgerigar (Melopsittacus undulatus), zebra finch (Poephila guttata) and cockatiel (Nymphicus hollandicus).

A much wider variety of species can be sold by licensed wildlife dealers, of which there are currently 47 in Victoria (November 1998 figures). A licensed wildlife dealer can trade in most, but not all, of those species that can be kept by a private licence holder. In all, some 16 mammal species, 114 birds, 102 reptiles and 21 amphibians can be commercially traded in Victoria. Not all of these are found in the wild in Victoria.

The domestic market is very large. More than a million Australian households have birds as pets, and it has been estimated that over $150 million a year is spent on them. While some of these birds are exotics, the proportion of native species is substantial.

The pet market for reptiles and amphibians is much smaller - with the common long-necked tortoise (Chelodina longicollis), blue-tongued lizard (Tiliqua spp.) and the green tree frog (Litoria caerulea) perhaps the most often stocked (the latter is not found in the wild in Victoria).

The market for other species of reptiles and amphibians, and for mammals, is much more limited.

The number of native freshwater fish species sold, if any, in pet shops is not known.

The wildlife dealer or pet shop is required to advise the purchaser of wildlife whether a private wildlife licence is required to keep the animals and also provide printed information (as approved by the Department of Natural Resources and Environment) that outlines “the requirements for the proper feeding, care, housing and welfare of the species.”

Pet shops acquire the majority of their stock from breeders, many of whom may be amateur breeders (operating under a normal private wildlife licence) - see the section on aviculture below.

PETS AND COMPANION ANIMALS

Companion animals, or pets, play an important role in many people’s lives. The Senate Inquiry report made reference to research showing that:

Australia has the highest rate of pet ownership in the world with about 66 percent of households having some kind of companion animal and 88 percent of Australians having had a pet at some time.
The Senate Inquiry received strong evidence that many native animals, and particularly marsupials, do not make good pets. It also noted, however, that some native species could, and do, make good pets, and indeed are kept as pets overseas.\textsuperscript{47}

A number of native species are kept as pets in Victoria. In particular, many native birds (such as budgerigars, quails, galahs, sulphur-crested cockatoos), and several amphibians and reptiles (certain tortoises and skinks such as the common blue-tongue lizard) may be kept privately (without permit) - and are relatively easy to keep in captivity, are kept.

\textit{Table 6.2 Native animals that may be kept privately without a licence}

<table>
<thead>
<tr>
<th>Mammals</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dingo (\textit{Canis familiaris dingo})</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Birds</th>
</tr>
</thead>
<tbody>
<tr>
<td>King quail (\textit{Coturnix chinensis})</td>
</tr>
<tr>
<td>Budgerigar (\textit{Melopsittacus undulatus})</td>
</tr>
<tr>
<td>Zebra finch (\textit{Poephila guttata})</td>
</tr>
<tr>
<td>Cockatiel (\textit{Nymphicus hollandicus})</td>
</tr>
<tr>
<td>Western rosella (\textit{Platycerus icterotis})</td>
</tr>
<tr>
<td>Scarlet-chested parrot (\textit{Neophema splendida})</td>
</tr>
<tr>
<td>Bourke’s parrot (\textit{Neopsephotus bourkii})</td>
</tr>
<tr>
<td>Elegant parrot (\textit{Neophema elegans})</td>
</tr>
<tr>
<td>Turquoise parrot (\textit{Neophema pulchella})</td>
</tr>
<tr>
<td>Alexandra’s (Princess) parrot (\textit{Polytelis alexandrae})</td>
</tr>
<tr>
<td>Gouldian finch (\textit{Erythrura gouldiae})</td>
</tr>
<tr>
<td>Star finch (\textit{Neochmia ruficauda})</td>
</tr>
<tr>
<td>Blue-face finch (\textit{Erythrura trichroa})</td>
</tr>
<tr>
<td>Long-tailed finch (\textit{Poephila acuticauda})</td>
</tr>
<tr>
<td>Chestnut-breasted mannikin (\textit{Lonchura castaneothorax})</td>
</tr>
<tr>
<td>Double-barred finch (\textit{Taeniopygia bichenovii})</td>
</tr>
<tr>
<td>Red-rumped parrot (\textit{Psephotus haematonotus})</td>
</tr>
<tr>
<td>Rainbow lorikeet (\textit{Trichoglossus haematodus})</td>
</tr>
<tr>
<td>Painted firetail (\textit{Emblema pictum})</td>
</tr>
<tr>
<td>Peaceful dove (\textit{Geopelia placida})</td>
</tr>
<tr>
<td>Diamond dove (\textit{Geopelia cuneata})</td>
</tr>
</tbody>
</table>
Galah (*Cacatua roseicapilla*)
Sulphur-crested cockatoo (*Cacatua galerita*)
Little corella (*Cacatua sanguinea*)

### Reptiles

- Common long-necked tortoise (*Chelodina longicollis*)
- Murray River tortoise (*Emydura macquarii*)
- Marbled gecko (*Phylodactylus marmoratus*)
- Cunningham’s skink (*Egernia cunninghami*)
- White’s skink (*Egernia whitii*)
- Blotched blue-tongued lizard (*Tiliqua nigrolutea*)
- Common blue-tongued lizard (*Tiliqua scincoides*)
- Stumpy-tailed lizard (*Trachydosaurus rugosa*)

### Frogs

- Plains froglet (*Ranidella parinsignifera*)
- Common froglet (*Ranidella signifera*)
- Spotted marsh frog (*Limnodynastes tasmaniensis*)
- Southern bullfrog (*Limnodynastes dumerilii*)
- Southern brown tree frog (*Litoria ewingii*)

### Fish (bony fish and cartilaginous fish)

All species (unless listed under the *Flora and Fauna Guarantee Act 1988*).

### Invertebrates

All species (unless listed under the *Flora and Fauna Guarantee Act 1988*), including venomous species.

The small size of many reptiles, frogs and birds makes them attractive as household pets. Sugar gliders are sold as ‘pocket pets’ in the USA.48

Most tree frogs can be maintained easily in an enclosed aquarium.49 The green tree frog (*Litoria caerulea*), a common species native to northern Australia, is widely available in pet shops in Victoria - and indeed in many overseas countries. They are relatively easy to keep and they breed in captivity. They respond well to people, even when handled. In Victoria, however, only the holder of a wildlife licence can keep them.50

Many lizards and some snakes are easily kept in captivity. The side-necked tortoises are also relatively easy to keep in captivity. Kangaroos, because of their highly strung nature, do not make good captive pets.51
Of Australia’s approximately 150 species of freshwater fish, there are a number considered suitable for aquaria. Examples are listed in Table 6.3.

Table 6.3 Species suitable for aquaria use

<table>
<thead>
<tr>
<th>Species</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lungfish (<em>Neoceratodus forsteri</em>)</td>
<td>Small specimens are readily kept in aquaria</td>
</tr>
<tr>
<td></td>
<td>Not found in Victoria in the wild</td>
</tr>
<tr>
<td>Smelt (<em>Retropinna semoni</em>)</td>
<td>An attractive aquaria fish</td>
</tr>
<tr>
<td>Southern pigmy perch (<em>Nannoperca australis</em>)</td>
<td>An excellent aquaria fish</td>
</tr>
<tr>
<td>Spotted butterfish (<em>Scatophagus argus</em>)</td>
<td>An excellent aquaria fish, and used extensively</td>
</tr>
<tr>
<td>Western carp gudgeon (<em>Hyoseleotris klunzingeri</em>)</td>
<td>An excellent aquaria fish</td>
</tr>
<tr>
<td>Purple spotted gudgeon (<em>Mogurnda adspersa</em>)</td>
<td>An excellent aquaria fish</td>
</tr>
<tr>
<td>Flat-headed gudgeon (<em>Philypnodon grandiceps</em>)</td>
<td>Suitable for use in aquaria</td>
</tr>
</tbody>
</table>

Source: Derived from Lake, J.S. (1978), *Australian Freshwater Fishes.*

In Victoria native animals can only be obtained from captive-bred stock (other than in limited specially approved circumstances). Neither the native animal, nor its eggs or larvae, may be taken from the wild and kept, with the exception of declared pest species, fish and invertebrates.

**Sector Challenges**

Unlike most animals used as pets, native animals have not been subject to hundreds or, for many pet species, thousands of years of domestication. Some native animals, because of their size, temperament or environmental needs, are clearly not suited to captivity and domestic environments. Others may have potential, but their welfare depends on the knowledge and commitment of the keeper.

Animals Australia, a federation of groups dedicated to the protection and welfare of animals, is concerned about any extension of the species that are allowed to be kept as ‘pets’:

* Australians do not have a good record of animal treatment. Pets, particularly dogs, cats and caged birds, are abandoned or surrendered to animal shelters at an alarming rate. Each year in Victoria alone over 30,000 animals pass through the RSPCA’s shelter ... Given that the animal husbandry needs of particularly dogs and cats are relatively well known in the community, it is a reasonable assumption that if native animals are to be kept as pets, each one with different and sometimes complicated habitat, diet and care needs, the failure rate of the ‘owners’ of these animals may be high.*
AMATEUR COLLECTORS AND ENTHUSIASTS

The keeping and breeding of birds and animals has long been a popular activity in Australia and around the world. The keeping and breeding of Australian native species, particularly species of native bird, have also been pursued by many enthusiasts. There appears to be growing interest in other native species - reptiles, amphibians and mammals. The World Wildlife Fund has reported that, worldwide, 350 million animals and plants are bought and sold internationally. Among these are more than five million wild birds.\(^{55}\)

As indicated in the previous section, a number of native birds, amphibians and reptiles do not require a licence to be kept in captivity. A wider range of species can be kept if the appropriate licence (under the \textit{Wildlife Act} 1975) is obtained - it is these more restricted species that are of most interest to the collector and enthusiast. Invertebrates, including a wide array of insects, may be kept without permit unless they are a defined rare or threatened species.

Schedules to the \textit{Wildlife Regulations 1992} list those species that may be kept by private persons. Additional species may, from time to time, be added to these schedules of permitted species, generally on the advice of the Wildlife Possession, Trade and Advisory Committee. The scheduled animals are those that are mostly available from captive-bred sources and meet criteria established by the ‘National Consultative Committee on Animal Welfare’ and the Victorian ‘Wildlife Possession Trade and Advisory Committee’.\(^{56}\)

It is required by law that all native animals kept by private collectors must be captive-bred and, apart from a limited number of very common species, can only be purchased from other appropriately licensed collectors or licensed commercial dealers. The Committee understands that there is, however, an illegal trade in Victoria - although, where birds are concerned, the stocks of licensed aviarists are often the target rather than wild sources. A significant portion the international animal trade is thought to be illegal.\(^{57}\)

‘Genetic fingerprinting’ is a technique whereby the unique genetic code of an animal is identified.\(^{58}\) It allows the offspring of native species bred in captivity to be tracked and those not derived from ‘fingerprinted’ animals to be identified. Its use is increasing as costs fall.

The Royal Society for the Prevention of Cruelty to Animals - Victoria (RSPCA) expressed reservation about the keeping of native animals at all. It believes that native animals should be maintained in their natural environments and not in captivity, unless such captivity is of proven benefit to the species concerned.\(^{59}\)
At the same time, amateur collectors often have considerable skill, and they may be a reservoir of valuable expertise in care and conservation of some species.\textsuperscript{60}

**Aviculture**

The keeping and breeding of native birds (and non-native birds) is a popular activity in Victoria - providing enjoyment to a large number of people.

The Victorian Aviculture Council, the representative peak body for aviculture in Victoria, represents several thousand bird breeders. It is affiliated with 23 other aviculture organisations, at least one of which has a membership of over 2,000 in its own right.\textsuperscript{61} Most aviarists are members of an aviary club.

Of Victoria's 7,509 private wildlife licences (Categories 1, 2 and 3, as at 23 November 1998), the great majority are held by amateur bird enthusiasts.\textsuperscript{62} Only a smaller number of aviculturists are commercial operators.

Popular species kept include cockatoos, budgerigars, quails, parrots and finches. As detailed in Table 6.4, 24 native-bird species can be kept in Victoria without a licence and some 209 species of bird may be kept by holders of a licence.

**Table 6.4 Native birds that may be kept by holders of a private wildlife licence**

<table>
<thead>
<tr>
<th>Grouping</th>
<th>Number of species</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quail</td>
<td>8 (one other species can be kept without a licence)</td>
</tr>
<tr>
<td>Doves and pigeons</td>
<td>19 (two others can be kept without a licence)</td>
</tr>
<tr>
<td>Ducks, geese and swans</td>
<td>20</td>
</tr>
<tr>
<td>Parrots and lorikeets</td>
<td>25</td>
</tr>
<tr>
<td>Rosellas (<em>Platycerus spp.</em>)</td>
<td>All, except the western rosella (<em>Platycerus icterotis</em>), that is 7</td>
</tr>
<tr>
<td>Finches, pardalotes, chats, mannikins, lapwings and firetails</td>
<td>15 (seven other species can be kept without a licence)</td>
</tr>
<tr>
<td>Honeyeaters and wattlebirds</td>
<td>3</td>
</tr>
<tr>
<td>Magpies and kookaburras</td>
<td>2</td>
</tr>
<tr>
<td>Cockatoos and cockatiels</td>
<td>5 (four other species can be kept without a licence)</td>
</tr>
<tr>
<td>Fairy wrens</td>
<td>4</td>
</tr>
<tr>
<td>Budgerigars</td>
<td>(Can be kept without a licence)</td>
</tr>
<tr>
<td>Emus</td>
<td>1</td>
</tr>
</tbody>
</table>

*Source: Derived from the Schedules to the Wildlife Regulations 1992.*
In Victoria, most aviculturists who hold ‘private wildlife licences’ are involved in bird breeding. Most also trade birds, to acquire new species and specimens and to sell surplus birds. They use these sales to recover some of their costs. The breeding of rare or hard-to-breed species is a challenge taken up by some of the more experienced enthusiasts.

The Committee had the opportunity to visit the aviaries of a leading aviculturist in the Latrobe Valley - Mr Chris Hunt. Mr Hunt keeps 14 different species of cockatoos and parrots. As with most aviculturists, Mr Hunt keeps his birds in large aviaries, each divided into smaller cages of variable size according to the species’ needs. The establishment of an aviary is expensive and proper maintenance and care requires a significant commitment of time and resources.

Birds are sold to other aviculturists and to pet shops. Aviary clubs produce lists of species available from members and provide a guide to current prices. At present, prices of birds are tending to fall. Most birds in Australian aviaries have been bred in captivity. While wild capture is allowed under permit in some States and the Northern Territory, wild-captured stock is not considered well suited to aviaries.

**Sector Issues and Challenges**

Noisy birds are an issue for neighbours in the near vicinity of aviaries. Theft is a large problem for aviculturists. Inconsistency of regulations between States and the need for import/export licences when birds are taken across State borders are issues of concern. Some aviculturists consider that the current minimum space guidelines for each species are too low and they want improved methods to ensure that all birds are kept under humane conditions.

The Victorian Avicultural Council suggested, in its submission to the Inquiry, that the ranching of pest species of cockatoo “by the taking of eggs from the wild and hand raising the chicks” would be “a plausible and cost effective practice which would reduce the demand for smuggled cockatoos”. The Council has a policy of supporting the humane and government-monitored export of captive-bred wildlife species, “provided that such export does not adversely affect the captive and/or wild populations in Australia”. It suggested that such export trade “may provide employment and export dollars, whilst alleviating the illicit trade in these species”. The RSPCA had a contrary view. It considers that the taking of “native birds from the wild to sell as pets is cruel and is accompanied by a huge and unacceptable death rate.” Birds Australia was concerned that legal trade could be used as a cover for illegal trade in birds.

**Reptiles**

There are approximately 500 Victorian members of the Victorian Herpetological Society and a larger number of unaffiliated, licensed reptile hobbyists in Victoria.
Private reptile enthusiasts may trade their animals within Victoria and elsewhere in Australia. Some species of captive-bred reptiles may fetch quite high prices. For instance, in Victoria captive-bred black-headed pythons, woma pythons and diamond pythons sell for about $3,000 each.\(^7\)

Over 120 species of reptile may be kept in Victoria. Most, but not all, of these are also found in the wild in Victoria. As noted in Table 6.5, while a number of species can be kept without a licence, most require the keeper to be licensed under the *Wildlife Act* 1975. The Committee notes that a number of species of venomous snake could be kept in Victoria by private collectors.

**Table 6.5 Native reptiles that may be kept by holders of a private wildlife licence**

<table>
<thead>
<tr>
<th>Grouping</th>
<th>Number of species and notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crocodiles</td>
<td>2, neither native to Victoria</td>
</tr>
<tr>
<td>Tortoises and turtles</td>
<td>6 (2 other species can be kept without a licence)</td>
</tr>
<tr>
<td>Geckos</td>
<td>19 (1 other species can be kept without a licence)</td>
</tr>
<tr>
<td>Dragons</td>
<td>18</td>
</tr>
<tr>
<td>Skinks</td>
<td>26 (2 other species can be kept without a licence)</td>
</tr>
<tr>
<td>Legless and frilled lizards</td>
<td>6</td>
</tr>
<tr>
<td>Monitors and goannas</td>
<td>9</td>
</tr>
<tr>
<td>Blue-tongued and stumpy-tailed lizards</td>
<td>Nil, but 3 species can be kept without licence</td>
</tr>
<tr>
<td>Pythons</td>
<td>9</td>
</tr>
<tr>
<td>Death adders</td>
<td>3, all venomous</td>
</tr>
<tr>
<td>Snakes</td>
<td>25, including venomous species</td>
</tr>
</tbody>
</table>


While the Victorian Herpetological Society noted in its submission that the current Victorian system of licensing was satisfactory, it considered that it could be made more efficient. It went on to state that people interested in keeping native wildlife are put off by:

> The many and varied types of licensing, ... the cost of some licences, ... the often unnecessary paperwork ... and the knowledge that there is a certain component of the enforcement staff that may be regarded as over zealous.

It also indicated that consistency of regulations between States and with the Federal Government is an issue that their members would like to see addressed.

While not actively seeking access to reptiles from the wild, the Society stated that it would support proposals for such collection as long as this was done in an appropriate manner and "did not jeopardise naturally occurring wild populations".\(^7\)
Amphibians

The Committee was not able to obtain information on the nature and extent of amphibian keeping by enthusiasts. It would seem to be an active, but small, sector.

Five common species of Victorian frog can be kept without a licence; an additional 20 species can be kept with a licence under the *Wildlife Act 1975*. Of the latter species, seven are not found in the wild in Victoria.

Mammals

A number of specified native mammals may be kept, bred and sold in Victoria. The liberalising of wildlife regulations in 1992 fostered interest in the keeping of marsupials in this State; an increasing number of individuals now keep and breed marsupials in captivity. In 1995, an organisation was established to cater for their interests - the Marsupial Society of Victoria. This Society promotes the study and conservation of the wild population, captive breeding of marsupials, and disseminating information. It currently has 60 members from both urban and country areas. The members keep a range of species, especially possums, sugar gliders and small wallabies.

Private enthusiasts require a licence, under the *Wildlife Act 1975*, to keep and breed such mammals. These licences also permit licence-holders to sell animals privately, but only to other licence-holders.

Currently some 19 species may be kept in captivity in Victoria. These are listed in Table 6.6. Not all of these species occur in the wild in Victoria, although all are at least relatively common in one or more States of Australia. Holders of private wildlife licences are not permitted to collect or release animals into the wild or cross-breed animals of different species.

*Table 6.6 Native mammal species that may be kept*

<table>
<thead>
<tr>
<th>Species</th>
<th>Notes on wild status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fat-tailed dunnart (<em>Sminthopsis crassicaudata</em>)</td>
<td>Not found in the wild in Victoria</td>
</tr>
<tr>
<td>Kowari (<em>Dasyuroideus byrnei</em>)</td>
<td></td>
</tr>
<tr>
<td>Wombat (<em>Vombatus ursinus</em>)</td>
<td></td>
</tr>
<tr>
<td>Common brushtail possum (<em>Trichosurus vulpecula</em>)</td>
<td></td>
</tr>
<tr>
<td>Sugar glider (<em>Petaurus breviceps</em>)</td>
<td></td>
</tr>
<tr>
<td>Common ringtail possum (<em>Pseudocheirus peregrinus</em>)</td>
<td></td>
</tr>
<tr>
<td>Rufous bettong (<em>Aepyprymnus rufescens</em>)</td>
<td>Not present in the wild in Victoria since 1900, but occurs elsewhere</td>
</tr>
<tr>
<td>Tasmanian bettong (<em>Bettongia gaimardi</em>)</td>
<td>Not present in the wild in Victoria since 1900, but occurs elsewhere</td>
</tr>
<tr>
<td>Species</td>
<td>Notes on wild status</td>
</tr>
<tr>
<td>---------------------------------------------</td>
<td>--------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Western grey kangaroo (<em>Macropus fuliginosus</em>)</td>
<td>Not found in the wild in Victoria</td>
</tr>
<tr>
<td>Kangaroo Island kangaroo (<em>Macropus fuliginosus fuliginosus</em>)</td>
<td></td>
</tr>
<tr>
<td>Eastern grey kangaroo (<em>Macropus giganteus</em>)</td>
<td>Only a subspecies, the eEastern wallaroo (<em>Macropus robustus robustus</em>) is found in the wild in Victoria</td>
</tr>
<tr>
<td>Common wallaroo (euro) (<em>Macropus robustus</em>)</td>
<td></td>
</tr>
<tr>
<td>Red-necked wallaby (<em>Macropus rufogriseus</em>)</td>
<td></td>
</tr>
<tr>
<td>Red kangaroo (<em>Macropus rufus</em>)</td>
<td></td>
</tr>
<tr>
<td>Tammar wallaby (<em>Macropus eugenii</em>)</td>
<td>Not found in the wild in Victoria</td>
</tr>
<tr>
<td>Tasmanian pademelon (<em>Thylogale billardierii</em>)</td>
<td>Not present in the wild in Victoria since 1930, but occurs elsewhere</td>
</tr>
<tr>
<td>Red-necked pademelon (<em>Thylogale thetis</em>)</td>
<td></td>
</tr>
<tr>
<td>Red-legged pademelon (<em>Thylogale stigmatica</em>)</td>
<td>Not found in the wild in Victoria</td>
</tr>
<tr>
<td>Swamp wallaby (<em>Wallabia bicolor</em>)</td>
<td></td>
</tr>
<tr>
<td>Mitchell’s hopping mouse (<em>Notomys mitchelli</em>)</td>
<td></td>
</tr>
</tbody>
</table>


The Marsupial Society of Victoria has proposed that the keeping of some additional species be permitted in Victoria, especially those that are already captive bred. The Society noted that: “captive bred animals which are in excess at Royal Melbourne Zoo and Healesville Sanctuary … are constantly being sent to interstate hobbyists or euthanased”.

WILDLIFE SHELTERS

The rehabilitation of injured and orphaned fauna is a costly and specialised sector. Within Victoria volunteers who have established wildlife shelters generally undertake this work. They operate under permits granted under the Wildlife Act 1975. The permits specify the premises in which the wildlife shelter operates, as well as the name and location of any associated foster carers.

There are currently 241 authorised operators of Wildlife Shelters in Victoria. They are required to operate in accordance with a Code of Practice. In any one year around 9,000 animals from 427 different species are admitted to shelters in Victoria.

The objective of Wildlife Shelters is to rehabilitate wild animals and restore them to the wild as soon as possible. In some cases this is not possible, due to the severity of...
the injuries or imprinting of human behaviour as a result of spending too long in captivity. 77

While a wildlife shelter will generally take in any species (with the exception of snakes, for which a licensed snake-catcher is required), some shelters offer specialist care for particular species, such as large or dangerous animals.

The operation of shelters is reliant on dedicated volunteers who require expertise in animal husbandry, as well as in techniques for rehabilitation and release of native wildlife. Such personnel not only operate the shelters, but also have to raise funds for specific feeding formulas, equipment and enclosures, as well as collect fauna, for example when displaced and burnt in bushfires. 78 They are not permitted to charge for their services, but may accept donations.

Issues

One of the operators of a wildlife shelter, who also operates an educational program known as the Possum Lady program, was concerned that the commercial utilisation of animals would greatly conflict with the message of preservation underlying her activities. 79

OUTDOOR EDUCATION

The study of native flora and fauna forms part of the curricula of many Victorian schools and universities. The Victorian Association of Environmental Education, a community-based group, fosters a range of ‘hands-on’ programs, many of which involve the survey and ecology of native plants and animals.

ART, BOOKS AND FILMS

Native flora and fauna have provided inspiration to artists, musicians and poets. Wildlife films and ‘coffee-table’ books continue to be produced and enjoyed by many. Specialist guidebooks are available for most of the major groups of wild plants and animals found in the wild in Victoria. All such uses depend, to a greater or lesser extent, on the living presence of native species.

An ‘Art of the Environment’ group which is based on Kings Park, Perth, has a considerable output which brings substantial returns to Western Australia. The Field Naturalists Club of Victoria runs courses in native-species art. 80 The Box Hill College of TAFE also provides courses in wildlife and plant art. Wildlife and plant artists are employed by scientific institutions and by the Museum of Victoria.
5 ibid., p. 10.
6 ibid., Introduction (by Prof Kerin O’Dea, Department of Human Nutrition, Deakin University).
12 Zola, N. and Gott, B. (1992), Koorie Plants Koorie People. Traditional Aboriginal Food, Fibre and Healing Plants of Victoria. Koorie Heritage Trust, Melbourne, Victoria, pp. 52-56;
13 ibid., p. 38.
18 Freeman; G. (1999), personal communication, 14 February 1999.
23 Australia is the source of a number of weeds in other countries (such as paperbarks in Florida and wattles in South Africa). Consequently it is also the location where bio-control organisms will be most successfully sought.
24 AMRAD Discovery Technologies, Written Submissions, No. U38.
25 The Weekend Australian, June 5-6, 1999, p. 16.
26 AMRAD Discovery Technologies, Written Submissions, No. U38.
27 ibid.

Venom Supplies Pty Ltd, Written Submissions, No. U16.


Venom Supplies Pty Ltd, Written Submissions, No. U16.

ibid.

As at 23 November 1998 there were 23 holders of Commercial Wildlife (Wildlife Taxidermist) Licences under the Wildlife Act 1975 - information provided by the Department of Natural Resources and Environment.

Who are also licensed under the Wildlife Act 1975.

Based on statistics provided by Mr Gary Pegg, President, Australian Taxidermy Association.


The Australian Taxidermists Association, Written Submissions, No. U37.

The submissions of Field and Game Australia Inc and Shooting Sports Council of Victoria, Written Submissions, No. 41 also raised this issue of export of hunter’s trophy specimens.

There are eight such controllers licensed under the Wildlife Act 1975.


ibid., p. 55.


Wilson, G.R., (1998) in Hyde, K. (ed) (1998), The New Rural Industries - A Handbook for Farmers and Investors, Rural Industries Research and Development Corporation, Canberra, p. 55. This reference quotes an example of the “hooded parrot which were worth thousands of dollars 20 years ago now fetch $80 per pair”.


The figures are derived from the schedules to the Wildlife Regulations 1992.


ibid., pp. 333 - 344.

ibid., p. 339-141.


Unless they are a declared protected aquatic biota or listed under the Flora and Fauna Guarantee Act 1988 - the taking of fish also requires a Recreational Fishing Licence.

Animals Australia, Written Submissions, No. U56.


The Marsupial Society of Victoria Inc., Written Submissions, No. U74.


ibid.

As was noted by the Committee in discussions held during field inspections.


Birds Australia, Written Submissions, No U30.


The Marsupial Society of Victoria Inc., Written Submissions, No. U74.


The Marsupial Society of Victoria Inc., Written Submissions, No. U74.

The Code of Practise is under the authority of the Prevention of Cruelty to Animals Act 1986.

Information provide by Ms. Jane Dyke, Environmental Research Coordinator, Flora and Fauna, Department of Natural Resources and Environment, 17.6.1999.

Information provide by Ms. Jane Dyke, Environmental Research Coordinator, Flora and Fauna, Department of Natural Resources and Environment, 17.6.1999.

Yvonne Cowling, Written Submissions, No. U22.

ibid.

CHAPTER 7
ENVIRONMENTAL ISSUES

• INTRODUCTION
• RISKS TO ECOLOGICAL PROCESSES
• RISKS TO BIODIVERSITY
• POTENTIAL IMPACTS OF UTILISATION
• ISSUES ARISING FROM MODIFICATION OF ECOSYSTEMS
• CASE STUDIES
• LIMITS TO KNOWLEDGE

INTRODUCTION

In the preceding chapters, the Committee explored the many commercial and environmental benefits that may be derived from the utilisation of native species.

The Committee found that a number of environmental issues must be addressed, and safeguards applied, to ensure that utilisation of native flora meets the ecological sustainability objectives of the ESD framework. These issues are reviewed in this chapter. For each issue, the ecological principles involved are described.

Issues considered are:
   a) risks to ecological processes;
   b) risks to biodiversity;
   c) potential impacts of utilisation; and
   d) issues arising from the modification of ecosystems.

Though the issues raised in this chapter are many, the Committee does not believe that they are insurmountable. They do, however, consider that the utilisation of native flora and fauna should proceed with caution. The Committee also notes that these issues are no greater than (and possibly less than) those facing conventional primary production using exotic species.

A number of case studies are included to give a sense of the complexity of these environmental issues associated with the utilisation of native flora and fauna. They are:
   a) kangaroo harvesting;
   b) trade between zoos; and
   c) tree-fern harvesting.
Finally the Committee considers briefly the challenge presented by limits to knowledge of the species and systems being utilised.

**RISKS TO ECOLOGICAL PROCESSES**

Ecological processes include flows of matter and energy, interactions between organisms, evolution of species and maintenance of the physical environment on which plants and animals depend.

**Energy Flow and Nutrient Recycling**

Only plants containing chlorophyll and some micro-organisms can capture energy directly from the sun. These organisms can also obtain mineral nutrients in inorganic form from soil or water. All other organisms must obtain energy by consuming other organisms or the partly decomposed remains of other organisms. They also gain many important nutrients in the same way.

At each feeding or trophic level the maximum amount of energy that can be converted to growth is less (and generally much less) than 10 per cent of the energy consumed. Consequently the total mass of organisms at each trophic level in an area is less than the mass of organisms in the trophic level below it. The mass of herbivores is much less than that of the plants and the mass of carnivores that feed on herbivores (primary predators or scavenges) is much less than that of the herbivores. The mass of secondary predators or scavengers is still less than that of the animals on which they feed.

If a species is to survive, there must be an adequate supply of the animals or plants on which it feeds. This influences the interactions between species. Interactions are discussed in more detail in the next section.

The productivity of an area is set, in the first instance, by its capacity to grow plants. This in turn is related to soils, climate and total grazing pressure. ‘Total grazing pressure’ is the sum of the plant material removed by all the grazing animals on a site. If it exceeds the growth capacity of the plants the amount of plant material left to capture energy from the sun declines. The ecosystem enters a downward spiral in which productivity continues to fall until total grazing pressure is reduced through death or removal of the grazing animals.

Scavengers (for example yabbies and ravens) and saprophytes (organisms which gain energy by decomposing dead organic material) depend on the remains of plants or other animals. When native animals are harvested, rather than killed by predators or other natural means, populations of predators, scavengers and saprophytes are all affected, as their energy source is diminished.
Scavengers and saprophytes also play an important role in returning nutrients to soil and water for re-use, and in incorporating organic matter into soil. Where plants or animals, whether native or exotic, are removed from the ecosystem, nutrients in them are lost from the locality. These must eventually be returned or the productivity of the ecosystem will decline.

**Total Grazing Pressure**
Locally native animals, particularly the large kangaroos, wallabies, possums, koalas and some native birds, can contribute to total grazing pressure, and hence to overgrazing and reduced productivity. Fragmentation of their habitats plays a large part in the periodic build-up of large numbers of these animals by denying them the opportunity to move to new feed. The native animals concerned all require some native tree and shrub cover in their habitat. They do not normally range far from such cover.

While native animals may contribute to total grazing pressure, so also do domestic stock and pest animals such as rabbits, hares and feral goats. Overgrazing provides one argument for the cull or harvest of native animals, but other responses can be appropriate. These could include eliminating the feral pests and, as graziers commonly do, reducing stocking of farm animals during periods of drought. For most valuable crops, such as lucerne or vegetables, kangaroo-proof fencing could be considered.

In some districts it may be practical to locate crops on a property beyond the main feeding range of the native animal - that is, remote from the tree and shrub cover that forms an essential part of their habitat.

Relocation of native animals has proved effective where there are suitable habitats in which to place them. The Committee notes that the relocation of koalas has been used to reduce excessive local browsing and restore populations to habitats from which koalas had died out. The success of this program is creating some problems. Populations are now so widely established and successful that additional suitable sites for relocation are now difficult to find. Alternative methods, such as contraception, for control of koala populations are being investigated.

Several submissions, as well as evidence at the Inquiry’s public hearings, refer to the ‘waste’ of kangaroos and other culled animals left on properties under Victorian regulations. However a contrary view has been put that, from an ecological point of view, nothing is truly wasted: every dead organism becomes a source of energy and nutrients for other organisms.

One submission also drew attention to the impact of nutrient loss through the removal of animals or plants. Nutrients removed through harvest of plants or animals must lead eventually to the need for replacement of the nutrients lost. The advantage of native plants - their ability to grow in low-nutrient soils - has limits.
Interactions Between Species

As the Committee indicated in the preceding section, reducing the population of one species can have impacts on other species of animals or plants. These interactions may be subtle and it may take some time for the effects to become obvious. Because of the complexity of ecological systems, “incipient change may not be detected until an ecosystem has been irreversibly altered”.  

When prey species such as kangaroos or possums are removed, the consequence in the short term can be that predators such as dingoes and red foxes turn to different prey. These may be other native mammals or domestic stock. In the longer term, predator numbers may decline so that one of the controls on the native-prey population (as well as introduced pests such as rabbits) is weakened.

On the other hand, increase in populations of herbivores, such as kangaroos, leads to increase in the population of predators. This, in turn, tends to reduce the populations of herbivores. The Committee understands that the destruction or exclusion of dingoes has probably contributed to increasing numbers of kangaroos in some areas. In Victoria predation by feral dogs would provide some balance to the loss of dingoes.

Recher, Lunney and Dunn, in The Natural Legacy, illustrate the consequences of these complex interactions:

European impact on wildlife was not always immediately detrimental ... Kangaroos and wallabies, which were not reported to be numerous in the Great Dividing Range in New South Wales [and Victoria] before it was settled ... were so abundant in the 1870s, that pastoralists petitioned the governor for help in controlling them. From 1880 ... tens of thousands were killed. By the late 1890s kangaroo numbers had fallen ... As kangaroo numbers fell, ... wallabies and the introduced hare increased in abundance for about 20 years and then declined. Bettongs ... flourished with, or shortly after the wallabies, but as rabbits then foxes increased they too dwindled. ... The lesson to be learned ... is that an abundance of wildlife can be transient. Even the most common species can disappear as the environment is progressively altered.

Similar interactions occur in aquatic ecosystems. For example, Mosquito fish (Gambusia affinis), introduced in the 1920s, competes with, and prey upon, native fish. In some Australian streams this species has succeeded in excluding native fish altogether.

Build-up of nutrients in water bodies can alter interactions between species. The process of nutrient accumulation, known as eutrification, can lead to excessive growth of micro-organisms which can reduce the availability of light and oxygen for larger plants and animals and consequently they may become less abundant.
Interactions occur between members of the one species as well as between different species. This may be indirect - for example where excessive population growth leads to a reduction in food supply. With native species this usually leads to reduced fertility and death of young animals and other weaker individuals.\(^{23}\)

In more gregarious species there is normally a clear social organisation. Among Australian fur seals, for example, “the largest and most aggressive males compete vigorously for a place in the area frequented by adult females, each bull defending an individual territory ... unsuccessful bulls and bachelor males are completely excluded from the breeding area.”\(^{24}\) Dominance of a few males is common in other species as well, for example among the large kangaroos and common brushtail possums.\(^{25}\) Most of the time the dominance of these individuals is accepted and there is little disruption of the population. Removal of dominant males, as with cull or harvest, is likely to cause increased aggression and dislocation of populations.\(^{26}\)

Interactions within plant communities are equally complex. The removal or reduction in the population of one species can have substantial impacts on other species. The role that tree ferns play in the re-establishment of moist forests after disturbance provides an illustration. A study by the Department of Natural Resources and Environment (DNRE) has shown that a percentage of tree ferns survive and rapidly resprout fronds after wildfire. These provide a microclimate and a substrate for the establishment of other species.\(^{27}\)

Time lags in environmental responses make decisions based on short-term observations hazardous. This effect also creates a limitation on adaptive management approaches. The complexity of interactions between, and within, species suggest that a cautious approach to utilisation of native plants and animals is desirable. Studies of the interactions between the target and other species prior to utilisation, and if accompanied by ongoing research into long-term impacts, would assist in addressing such issues.

**Population Evolution**

The attributes of a species in a particular location have been produced by the evolutionary pressures in that locality.\(^{28}\) These equip the local population to live in that area. Wild-harvest of plants and animals produces a new set of selective pressures. For example, if the object of killing kangaroos is commercial harvest, the largest animals are the most likely target. These will normally be the dominant and fittest individuals. These would, in the natural environment, be most successful at mating. If the objective is population control for damage reduction, reproductive females will be targeted. In either case it is the weakest and least fit that are favoured. In the long term this will lead to a population less well adapted to survive in the natural environment. Only the objective of culling to enhance the population itself
would promote normal evolution. This, as described by the RSPCA, is culling of weak and old individuals.

Among plants, selection of individuals for yield or attractiveness will also produce unnatural selection pressures. The individuals removed are those which, because of their vigour or superior capacity to attract pollinating animals, would in all probability have produced the greatest quantity of seed. Thus their genetic material would have given them an evolutionary advantage. Harvest shifts this genetic advantage to less attractive or vigorous individuals.

At the same time, an alternative to culling of wildlife populations suggested by Animals Australia would also present a major disruption to the process of evolution. This alternative is contraception. At present contraception is practical only for captive animals, but research is being undertaken into a possible viral form of contraception. Mass contraception, if it were to become practical, would interfere severely with the process of evolution.

Maintenance of the Physical Environment

Soil, air and water are important components of the physical environment. Several practices associated with utilisation of native species have impacts similar to those of more conventional cultivation and processing of exotic species. These include the use of chemicals and resultant pollution hazard, and soil erosion.

Use of Chemicals

Native-flower crops are subjected to a number of environmentally damaging post-harvest treatments to increase vase life, or during fumigation for export. Two commonly used post-harvest treatments, silver thiosulfate (STS), used as an anti-ethylene treatment, and methyl bromide, an ozone-depleting substance used to control insect, bacterial and fungal pests, are being phased out around the world due to serious concerns over their environmental impacts. Alternatives to these chemicals are currently being investigated. MCP (1-methylcyclopropene) is showing promise as a replacement for STS. There is currently no suitable replacement for methyl bromide. The preserves and dyes used in the production of dried flowers are also coming under increasing scrutiny. The Committee understands that a move away from toxic chemicals currently used to treat cut flowers is an important, and sometimes overlooked, step towards achieving ecologically sustainable development of the industry.

Soil Erosion

Soil erosion results when the soil surface is exposed to the action of water or wind. Any activity that removes the protective cover of plants or plant litter exposes soil to erosion. Soils, once stripped of the most productive few centimetres of topsoil, can be very slow to recover.
Though hard-hoofed domestic stock and burrowing rabbits do much more damage to soil than do kangaroos (partly because the hard hoofs of the former can damage both plants and soil surface, and the latter burrow and chew roots) native animals can contribute to total grazing pressure. Total grazing pressure has been mentioned in relation to loss of plants. By contributing to unsustainable grazing pressures they may also exacerbate soil erosion and, as a consequence, affect water quality.\textsuperscript{36}

In Victoria the density of native animals in the wild is usually insufficient to contribute much to the erosion risk. However, densities of farmed animals (specifically emu) can be sufficient to cause erosion if they are kept on erosion-prone land.\textsuperscript{37} Methods to manage soil erosion are, however, well understood in Victoria. Sound site selection and management can deal with this issue.\textsuperscript{38}

Human trampling, access roads, paths and tracks can lead to soil compaction and erosion.\textsuperscript{39} This is one of the more common impacts of recreational activities, but wild-harvesting of native plants can also lead to erosion.

**RISKS TO BIODIVERSITY**

The Committee pointed out in Chapter 2 that biodiversity operates at genetic, species and ecosystem levels.\textsuperscript{40} It relates to the diversity of species indigenous to the location and natural ecosystems. Any process that reduces the natural diversity of populations or ecosystems diminishes biodiversity.

The Committee identified activities that can be associated with utilisation of native plants and animals and pose a threat to biodiversity. These include:

a) translocation of native species to areas where they have not previously occurred;
b) genetic pollution and impoverishment;
c) habitat loss and modification; and
d) depletion of populations.

**Translocation**

Translocated species or populations are organisms that may be native to some parts of Australia, but have been introduced beyond where they naturally occur. This includes introduction of individuals of species that may occur in the new locality, but have “genetic stock and/or populations that are distinct from those in the source area”.\textsuperscript{41}

Where they affect populations indigenous to the area and ecosystems, this can impact on biodiversity.

Translocated species may establish as feral populations in the new location. An example noted by the Committee is Sweet Pittosporum (\textit{Pittosporum undulatum}). This species, which is indigenous to coastal hills of eastern Victoria and NSW, has been introduced as a garden plant to more westerly areas. It is now invading forests of central Victoria.\textsuperscript{42} Prickly acacia (\textit{Acacia paradoxa}), a native of all mainland States, has
been introduced to Tasmania, where its spread over dry hillsides is considered to be excessive.43

Escape of organisms from the site to which they are introduced is difficult to prevent.44 With plants whose seeds are carried by birds or other animals the risk is particularly high. Consequently it is reasonable to assume that, if such a plant is introduced into a new area, it will enter local ecosystems.

Aquatic species, once released into a waterway, are likely to move throughout streams within the catchment. Because of this the ‘Flora and Fauna Guarantee – Scientific Advisory Committee’ has recommended listing the stocking of fish as a potentially threatening process where the species, though native to Australia, or even Victoria, was not previously part of the aquatic community in the location of the release; that is: the deliberate or accidental introduction of live fish into private waters within a Victorian river catchment in which the taxon to which the fish belong cannot reliably be inferred to have been present prior to the year 1770 AD.45 In line with this concern, introduction of marron into Victoria from Western Australia is currently prohibited because of its likely impact as predator of, and competitor to fresh-water species (particularly yabbies) in Victoria’s streams and rivers.

For animal species in general, the risk associated with their translocation depends on the likelihood of their escaping from the site to which they have been introduced, as well as the probability of their establishing in the wild should they do so.

Introduction of pathogens is also a hazard. The spread of phytophthora dieback to Western Australia has been attributed to the introduction of infected plants from the eastern States. As the Committee mentioned in Chapter 4, it is because of the risk of introducing disease that permission to introduce barramundi to Victoria has so far not been given.

A code of practice has been developed under the National Translocation of Live Aquatic Organisms Policy to deal with the translocation of aquatic species.46 The Code includes the following points:

a) consideration should be given to local species first, to see if any can do the required job instead;
b) full information is required on the current biology and ecology of the candidate for translocation: an assessment of the likely impact of the new species in light of this information and impacts of other similar introductions;
c) should the translocation be allowed, initial quarantine is required to determine if parasites or pathogens are present - total restriction should apply until approval has been given;
d) introduction should be a one-off event; and
e) public education is needed to ensure that the public understands reasons for restrictions. 47

However, translocation of a species at risk (particularly fish species) may be appropriate where the natural habitat of the species has been so degraded that “translocation of the fish species may be the only means of saving wild populations”. 48

**Genetic Pollution and Impoverishment**

Biodiversity is concerned with maintenance of the genetic character of local populations. 49 The Maroondah City Council pointed out that genetic variation between different populations of the one species can be considerable. 50 Such genetic diversity within and between populations represents a resource on which future generations of the species can draw to meet changes and new hazards. In the long term it may be a resource that is useful to people as well. Introduction of individuals from populations with different genetic characteristics will change the genetic (and ultimately the physical) character of a wild population. This is referred to as genetic pollution.

The genetic character of a population is a product of past evolution. Consequently the processes that the Committee discussed above in relation to evolution ultimately impact upon biodiversity.

Utilisations of native species that incur the risk of genetic pollution include introduction of populations or genetic material (for example pollen, seeds, eggs) from other localities and release of individuals or genetic material that have been modified by deliberate selection or genetic engineering. 51

Breeding and selection are necessary aspects of cultivation of native species. The Committee was told that the high yields and suitability of conventional crop and pasture species to agricultural production has been achieved through great expenditure of time and effort. 52 Similar effort committed to native plants may achieve just as much in terms of productivity and suitability, while capturing advantages inherent in these species. 53 However, native species subject to selection for farming or cultivation become genetically dissimilar to wild populations. 54 Should such populations be released or escape to the wild there is a risk of genetic pollution of wild populations. 55 Features that make a species desirable when used commercially may be less than desirable in the wild. For example, selection for disease resistance could, in the wild, lead to a weedy strain of a plant. 56

The Committee notes that native-plant farming may have a higher potential for genetic pollution of natural populations than native-animal farming because cross-fertilisation between commercial cultivars and wild species of plants is difficult to prevent. On the other hand, the point of view has been put to the Committee that most selections for cultivated production would disadvantage the plant in the wild (for
example need for fertiliser or irrigation to attain best growth) and so few selected varieties would be likely to survive in the wild.57

The Australian Conservation Foundation has proposed a number of strategies to achieve reduced genetic pollution from native crops.58 They have suggested selecting crops that are reproductively incompatible with, or flower at different times from, wild populations; growing crops at sufficient distances from wild populations to prevent pollination by wind or other vectors; and making the survival of crops contingent on artificial conditions within the farm system, such as water or fertiliser.

The Committee also understands that, because of genetic changes brought about by breeding and selection, cultivation and farming of native species cannot be viewed as a primary conservation tool. Conservation and the preservation of biodiversity are most fully addressed by protection of species in situ, within their natural habitats and with their natural genetic composition.

Introduction into the wild of individuals from a wild population that is not local can also impact on the genetic diversity (and character) of indigenous populations. 59 This practice was referred to in evidence presented to the Committee by the Royal Botanic Gardens.60 In the case described, introduced blue gums, commonly from Tasmania, can hybridise with local Victorian sub-species. Other examples reported to the Committee were the release or escape of emus imported from Western Australia61 and the stocking of waterways with fish62 and eels63 derived from interstate.

Habitat Loss and Modification

Habitat loss, modification and fragmentation are generally regarded as the main threat to the maintenance of the diversity of animal and plant species.64 It is widely accepted that habitat loss and fragmentation have played a large part in the decline, and (sometimes) extinction, of many small mammals within Victoria.65

Clearing of Victorian bushland continues to reduce and degrade habitats. Improved satellite monitoring has shown that an average of 2,544 hectares per year in Victoria were cleared in the period 1990-95, 60 per cent higher than estimates of clearing made for the national greenhouse emissions inventory.66

Native grassland habitats appear even more vulnerable to destruction or degradation. A recent study found that 44 per cent of grassland sites recorded in western Victoria in 1986 had, within a decade, been destroyed, severely degraded or are planned for destruction. A further 30 per cent have been degraded to some extent.67

Placing commercial value on native species was proposed by the Senate Inquiry68 and others as a method for protecting wildlife habitats, and hence, the wildlife species themselves.69
The importance of habitat has been acknowledged by many of the submissions and other evidence presented to the Committee. Birds Australia emphasised that loss of habitat is the main cause of decline in populations of many species in Victoria. This is true of plants and aquatic species as well as of land animals. For example conversion of natural ecosystems to grazing exotic pastures led to a substantial decline in the native yam or murnong \((Microseris lanceolata)\). Damming and other modification of Victoria’s waterways have caused the decline of native fish such as the trout cod. Conversion of forested land to agriculture has reduced the status of the Gippsland giant earthworm to ‘endangered’. The needs of this species were explained to the Committee during its study tour of South Gippsland.

Several larger mammals that have been described to the Committee as ‘super-abundant’, have been much less effected or apparently even advantaged by changes brought about by modern land use. However, some of these abundant species have in fact also experienced contraction of populations in parts of Victoria, due to loss of habitat.

For example the common wombat is in decline in western Victoria. Though cull may have contributed to this decline, it has been attributed, in the first instance, to the loss of native grasses that produce a flush of summer growth in the wombat’s breeding season.

The range of the eastern grey kangaroo has been altered by changes to its habitat. It occurs in widely varying densities, from between 24.6-42.2 per square kilometre in the protected Coranderrk Bushland, Healesville, to zero on intensively cultivated land. Over Victoria’s large areas of developed farmland and cropland, densities are generally much less than where there is native vegetation. These, and the other large kangaroos, are usually restricted to areas where remnant forest and woodlands provide cover.

An interesting exception to the widespread loss of habitat is the situation of the black wallaby. This species has increased its range into western Victoria. This is a result of expansion of its preferred habitat of dense understory regrowth – an expansion caused by logging and changed fire regimes.

Habitats of fish and other aquatic species have also been altered substantially as a result of changes to catchments and riparian vegetation, modification of the waterways by desnagging, dredging and changing alignments, and use of water for irrigation and urban supply. Consequently many aquatic species are also under stress.

In many Victorian streams the feeding habits of the introduced European carp exacerbated this problem. During its study tour of South Australia the Committee observed the improvement in water quality and resultant growth of native water plants and animals that resulted from removal of European carp.
Depletion of Populations

Destruction of individuals through harvesting, by-catch, road kill, or deaths associated with the mechanics of harvesting can represent an unsustainable drain on populations that are already stressed by loss of habitat.

The Senate Committee stated that:

The risk of over-harvesting should be low and legal harvesting should be set at a level well below the scientifically calculated off-take rate. Where a legitimate increase in quota is indicated, it should still incorporate a safety margin. There should be a low risk of ‘by-catch’ [or destruction] of non-target species.79

Over-harvesting

The present Committee has already noted that responses of populations to removal of individuals can be unpredictable and impacts are subject to time lags. Consequently, sustainable levels of harvest or cull are difficult to determine. Good and regular assessment of populations is needed to determine whether a species is secure or in decline. Such assessments have not, and are not generally, undertaken in Victoria, except for some fish species.80 As a result, a population can be severely reduced before it is realised that numbers are falling.

For example, earlier this century common wombats were considered to be so numerous that they had a bounty on them. More recently, though protected under the Wildlife Act 1995, they were declared ‘unprotected’. No assessment of their numbers was made and culling continued throughout Victoria until it was finally realised that populations were seriously depleted in the west of the State. Only then were they returned to ‘protected’ status. Wombats remain unprotected in the east of Victoria, although there is still no assessment of total population size or any changes that may be occurring.81

During the last half of the nineteenth century, koala populations appeared to increase rapidly in many areas to the extent that:

By the turn of the century huge numbers were being killed for their pelts, and koala fur became the staple of an important export industry. The population then declined greatly in the early decades of [the twentieth] century, due to both commercial harvesting and widespread habitat destruction. Disease, including ophthalmic disease and pneumonia, was also claimed to have had a widespread effect. By the 1920s grave fears were held for the survival of the species in Victoria, with estimates of the total population being as low as 500.82

Again, protected measures were only applied when population sizes had plummeted. Only an active breeding and relocation program has restored the koala population to its former range in Victoria.83
Impacts of over-harvesting can be long lasting. Populations of the Australian fur seal were severely depleted by exploitation in the nineteenth century. Although all hunting was outlawed by 1923, the population of this once-abundant animal is still well below its original size - nearly 100 years later.

This issue is considered further by the Committee in Chapter 9.

**By-catch and Incidental Damage**

As the Committee described in Chapter 4, non-target species can also be killed or damaged during harvest, hunting and recreational activities.

Attributing commercial value to a particular species, as advocated by the Senate Committee, may enhance protection of that species at the expense of others. For example, rather than conserving remnant bushland within which commercially valuable plants occur, a landowner might manage the bushland in a way that favours those plants, thus changing the ecosystem. Alternatively, bushland may be cleared altogether to establish a plantation. In this case many native species are lost from the site.

**POTENTIAL IMPACTS OF UTILISATION**

**Environmental Impacts of Wild-harvesting**

Harvesting of native animals can affect ecosystem functioning as a result of a number of actions. These include:

- a) the removal of individuals, eggs or (for plants) fruit, seeds or parts of the individual;
- b) the removal of nutrients through biomass;
- c) causing physical damage to non-target species;
- d) changing the genetic makeup and diversity of natural populations through removal of the ‘best’ individuals; and
- e) spread of pathogens, weeds and pests.

Wild-harvesting may have little or large impact on the target population. The Committee recognises that the impacts of consumptive use of native animals will depend on the size of the activity, how it is managed and characteristics of the particular species, as well as on the type of production method used.

The Committee notes that sustainable harvesting limits are difficult to establish and that by developing a market for a native species, pressure from both legal and illegal harvesting may increase. This has not always occurred, however. For example, as the Committee noted in Chapter 4, harvest quotas for kangaroos in South Australia are often not filled and harvests continue to be determined by population size. Kelp harvesting on King Island remains essentially steady, although there is a ready market should production increase.
If commercial use rather than culling for pest control is the primary object of the wildlife harvest, management of the target species may change. Efforts may be made to expand and improve the quality of the population and to ensure a more reliable yield. Possible interventions identified by the Committee include:

a) increase supply of a limiting factor at a critical time (for example water);
b) modify habitats to favour the target species;
c) remove competing species or predators;
d) protect the target population at critical times (for example nesting); and
e) captive breeding and release.

Many plant species have adaptations that make them resistant to attack by native parasites and diseases and so less in need of chemical protection than most exotic species. However, such benefits are not inevitable. Though local species may be resistant to local pests, parasites and diseases, those that can attack them are likely to have evolved with them. If their conditions of growth are changed, the native plant may become more vulnerable to attack. Soil compaction and altered drainage associated with harvesting, as well as vehicle contamination, can increase the risk of disease.

The Committee understands that the true extent to which harvesting affects the long-term viability of a natural system can only be determined through research and by stringent monitoring. The eight-year research program that is the basis of kangaroo quotas illustrates the effort required to provide a sound basis for substantial native-species harvest.

**Environmental Impacts of Cultivation and Farming**

Many of the impacts of harvesting on wild populations can be avoided through the domestication of native species, where this is practicable.

The farming of fish and other native animals in preference to wild-harvest has also received support from industry, although this is more equivocal. Not all species are suited to farm production (for example, as noted in Chapters 4 and 6, kangaroos have inappropriate behaviour and brown snakes do not breed readily in captivity). Several submissions also raised issues of animal welfare in relation to farming of native animals.

Loss of nutrients from the crop applies, as in any farming system.

Genetic change and loss of diversity is the norm under conventional farming systems. These systems require uniformity in the plants and animals used. It was explained to the Committee that producers need genetically reliable cultivars that minimise demands on cultivation or animal husbandry, are easy to harvest and satisfy market demands.
Genetic pollution, as described above, is a risk peculiar to farm or cultivation systems that use native plants and animals. Only native species are able to introduce modified genetic material into wild populations of native species. The Committee was informed that currently the DNRE has no practical program available to it to monitor the effects of gene flow between cultivated crops and wild populations.

In addition, disruption of the composition and social structure of the wild animal populations can occur if populations of farm-bred native animals are released or escape to the wild.

**Environmental Impacts of Ecotourism and Recreation**

The impacts of recreation on native species, apart from hunting and fishing, do not derive from direct removal of individuals from populations. Hunting and fishing incur the risks associated with removal of selected individuals. In this respect they involve similar risks to those attending wild-harvest, albeit generally at a lower level.

The rise of tourism to the forefront of world economic activity has only occurred in the last 20 years and the last five years have seen considerable expansion and change in the tourist industry in Victoria. Because the industry is changing rapidly, it is difficult to assess its ecological sustainability.

Though tourist activities do not directly consume plants or animals, the Committee found that they are not without impacts. Extensive evidence of visitor pressure can be found. Examples are soil erosion, stream-bank damage, introduction of weeds and diseases, trampling, water pollution and litter. Pressures to ensure that tourists see favoured species may lead to habitat modification or introduction of excessive numbers of favoured species with resultant population imbalance, genetic pollution and overgrazing of native vegetation.

Too much human presence or feeding of animals can lead to changes in animal behaviour, such as relocation, nest desertion and dependence on feeding by humans. For example, it has been found that female dolphins with young are unable to rest on peak days [in Port Phillip Bay] when there may be more than 60 approaches to their territory an hour by commercial tours plus the attention of ferries, power skis, dive and recreational vessels.

The Dolphin Research Institute, in its submission, explained that minimising impacts on animals must be based on a sound understanding of their ecology. This includes avoiding actions to change the animal’s behaviour. In the opinion of the Institute:

Wildlife-based tourism should only be allowed if appropriate interpretation programs form part of the experience, conveying sound values and knowledge to patrons. The use of wild populations for tourism with the inherent risks can only be justified if there is a long-term conservation outcome linked to quality education programs.
To be sustainable these impacts cannot exceed either the self-sustaining capacity of the ecosystem or management inputs to ensure that the natural resource base is maintained. Tourism Training Victoria explained to the Committee that one of the major deficiencies in present knowledge relates to the ‘carrying capacity’ of natural areas and species; that is the number of visitors that a given ecosystem can sustain and the management required to ensure sustainability.  

All relevant tourism strategies support the principle of ecologically sustainable development, but translation of these strategies into practice is often not evident. This, according to Preece et al., is due to a lack of understanding of processes and leadership on environmental matters. Consequently they recommend that:

Governments review the deficiencies in the understanding of environmental matters in the tourism industry and take appropriate steps to rectify these deficiencies.

Whether native plants and animals are the main focus of the activity, or it is concerned with a broader landscape, maintenance of the total ecosystem is necessary if the use is to be sustainable. Where animals are viewed in a small segment of their habitat (for example the little penguins on the beach at Phillip Island) sustainability of the activity depends on the maintenance of their whole habitat, even though this is not directly enjoyed by tourists.

Benefits from tourist activities may not necessarily lead to allocation of sufficient resources to maintain the whole ecosystems on which they depend. However, it is common for those utilising and enjoying a native species to be involved with only a small part of its habitat. They may be ignorant of the wider needs of the habitat and their impacts on it, or unable to contribute to its maintenance, or it may not be in their interest, as individuals, to do so.

ISSUES ARISING FROM MODIFICATION OF ECOSYSTEMS

In striving for utilisation of native species while sustaining Victoria’s natural resources, the Committee is mindful that the natural environment is already under stress.

Since the arrival of European settlers in Victoria in the early 1800s, many vegetation communities have been cleared, fragmented and degraded; large numbers of grazing animals, both feral and domestic, have been introduced; introduced carnivores (cats, foxes, dogs) have become widely distributed; different fire regimes have been imposed; wetlands have been drained and polluted; fertilisers and pesticides have been spread widely; and extensive areas of pasture and crops have replaced diverse native vegetation communities. Many of these changes have had major effects on populations of native flora and fauna.
Total grazing pressure now includes rabbits, with their much faster breeding rate and quicker response to increases in feed than those of kangaroos, wallabies, or (generally) domestic stock. Rabbits considerably complicate interactions between plants, herbivores and predators in southern Australia and increase the risk of unsustainable grazing pressures.

In forests clear-fell logging and managed fire regimes have been added to the natural disturbance of wildfire. Adaptations developed by plant and animal species to cope with wildfire do not necessarily afford them the same protection in the face of these new disturbances. Clear-fell also produces young, even-aged forests with few hollows to provide nesting sites for birds and arboreal mammals. This has led to the local population decline of several species, including possums, gliders, bats and some birds.

In the non-arid areas of Australia, of which Victoria forms an important part, it has been estimated that 44 per cent of the land is in need of treatment to reverse some form of degradation caused by intensive land use. Such degradation includes wind and water erosion, dryland and irrigation-induced salinity and vegetation degradation.

Aquatic ecosystems have also been modified as a result of soil erosion, salinisation, ‘regulation’ and diversion. Exotic species have also been introduced, placing stress on native-fish populations through competition and predation:

Eight species deliberately introduced from overseas have established self-maintaining populations in Victorian inland waters. These are ... Brown Trout, ... Rainbow Trout, ... European Carp, ... Goldfish, ... Tench, ... Roach, ... Redfin, and Mosquito Fish ... Chinook Salmon is maintained through constant restocking. Aquarium species ... have also escaped or been disposed of in the wild and ... established self-maintaining populations.

The Committee’s recent Inquiry into Weeds in Victoria highlighted the huge environmental and economic impact of exotic weeds in Victoria. Many of these weed species were deliberately introduced. Exotic animal pests create similar imbalances in the ecosystem.

These vast and rapid changes have placed great strain on native ecosystems and species. Victoria’s environment is far from being at equilibrium. The Committee recognises that assessing the long-term impacts of any form of utilisation under these circumstances is difficult. However, utilisation which places additional stress on populations could have unforeseen and severely deleterious impacts on some species.

CASE STUDIES

The Committee has discovered many common themes in relation to the utilisation of native plants and animals. Nonetheless there are often differences between sectors
and individual ventures that can make generalisation difficult. In this section the nature of these differences and some examples are considered.

**The Need for Case-by-case Assessment**

The diversity of Victoria’s plant and animal species is a reflection of the wide range of environments contained within its relatively small area, from semi-arid shrublands to wet montane forests. Soils vary from alkaline cracking clays to deep acid sands. The result is great diversity of vegetation, animals and opportunities for developing new enterprises based on native flora and fauna. At the same time it is important that entrepreneurs understand the conditions in which the species of their choice will thrive and constraints imposed by conditions at any given site. For example yabby farming is largely limited, by temperature and land type, to flat locations with clay soils of low permeability in the west and north of the State.

One of the consequences of this diversity within Victoria is that generalisations are difficult to make and generalisations are necessary if principles concerning the utilisation of native species are to be developed. Nonetheless, the sustainability of a particular utilisation often depends on particular circumstances of a species, a location or management practices. Both Friends of the Earth and the Australian Conservation Foundation suggested that environmental impact assessment prepared by the proponent could be used to deal with the circumstances of a particular venture.

The Senate Committee concluded that:

> Proposals for the commercial use of wildlife need to be identified and managed on a case-by-case basis. The conditions of commercialisation that are appropriate to each animal must be determined by the biology of the species, a basic knowledge of which should be ascertained prior to commencement of the proposal. Information about the species should include its distribution, abundance and demography. The challenge to achieving sustainability is to provide the necessary broad guidelines while taking adequate account of the specific circumstances of each proposed utilisation.

**Kangaroos**

Kangaroos, wallabies and possums are harvested from the wild in some States. Proposals have been put forward to hunt wombats and several bird species which are locally in large numbers and may be regarded as pests as well as having commercial value. Kangaroo harvesting illustrates some of the issues involved.

The basis of current harvests in other States is often population management of ‘super-abundant species’, that is, species whose numbers have increased locally in response to changes wrought by Western-style agriculture.
Most of the information relating to large kangaroos and their place in managed grazing has been obtained from semi-arid regions. In these regions rainfall is the driving variable. It determines what herbivores have to eat and, in turn, how far they must travel to feed. Rangeland grazing is the main farming activity in these regions, with cereal cropping only in the most reliably watered sections.

There are no true rangelands, as defined in the National Rangelands Strategy, in Victoria. Only parts of the Mallee resemble the semi-arid regions of South Australia and New South Wales in which kangaroos are harvested, and this land is largely in public ownership or cleared for cropping. As a result, much of the available information can only be related to Victoria with considerable caution.

In some species pregnant kangaroos on very limited feed retain the embryo in a condition of stasis or diapause. While feed is in short supply the embryo stops developing. Once conditions improve, growth of the embryo resumes and the mother gives birth at a time when feed is readily available to support the mother and her offspring. Eastern grey kangaroos show limited diapause but western greys show none. In times of drought many kangaroos also die of starvation. (In the rangelands a mortality of 50 per cent would be normal during drought.) While sheep and some cattle can survive by browsing on native shrubs, many kangaroos will die once grasses and herbs fail. This, in the absence of the introduced species, probably provides an adequate check on kangaroo populations and will maintain a long-term balance between kangaroos and their habitat.

Where domestic stock and rabbits add to total grazing pressure, large impacts on vegetation may occur unless their numbers are controlled by management.

Death of a proportion of adult kangaroos as a result of adverse conditions or human agency allows more young to be born and survive. The result is a change in the age structure of the population. Monitoring of such changes allows for early detection of overharvesting of population. So far there is no evidence that current harvest, based on a quota 10-15 per cent of the population in a region, threatens the conservation of the large kangaroos in the State where they are harvested.

The issue then becomes one of finding the most effective method to ensure adherence to the quota limit. The current method of annual monitoring populations and allocating quotas on the basis of these numbers incurs the high cost of regular surveys. This is a particularly significant issue for Victoria, where kangaroo densities are low compared with those in neighbouring States.

**Integrated Grazing Programs**

Proponents of kangaroo harvesting commonly put forward the argument that producing meat and leather from kangaroos is more desirable than from sheep or cattle. The long, soft foot of the kangaroo is far less damaging to native vegetation and soil than the hard hoof of exotic stock. Kangaroos bite off herbage rather than
tearing it as do sheep and (to a lesser extent) cattle. This also is less damaging to native vegetation. Unlike sheep, kangaroos also pass most ingested seed intact, providing the basis for future pasture growth. A system of mixed production from kangaroos and conventional stock has been advocated as a means of reducing pressure on the land and diversifying farmers’ income.

Representatives of Field and Game Australia and the Sporting Shooters Council of Victoria saw the issue as one of changing landowners’ perception of kangaroos from “being a debit to being an asset”. These organisations argued that allocation to landowners of the ownership rights to kangaroos is the first step in conservation of their habitats. This would encourage landholders to value these animals. A method to do this would be to allocate permits or tags to the landholder to establish his/her ownership. These permits or tags would then be tradable.

An additional benefit may derive from different dietary preferences of kangaroos and domestic stock. Kangaroos (and wallabies) do not necessarily select the same plants as those eaten by cows and sheep. Studies in the NSW rangelands showed that the diet of the large kangaroos overlapped to only a limited extent with that of sheep during times of plenty. It is during drought that there is substantial dietary overlap. Only then is total grazing pressure focussed on the same species.

How well these results can be applied to other regions remains to be seen, but it may be possible to make better use of available feed by utilising the preference of kangaroos and domestic stock for different vegetation.

The Committee recognises, however, that in order to provide a significant incentive for a shift in production to a mixed-grazing system, kangaroos would need to offer returns that are at least comparable with those from sheep or cattle. It is uncertain that they would do so at present.

Furthermore, the argument for kangaroo harvest in preference to current levels of domestic stock was also made with Australia’s rangelands in mind. Grazing in these areas is based on native plants that are particularly vulnerable to the harmful effects of hard-hoofed animals. Most of Victoria’s grazing occurs on introduced pasture species, which are adapted to hard hoofs.

There are other barriers to farmers appropriating the resource presented by kangaroos. The range of both individuals and a mob will seldom be confined to an individual property. Individual landholders can do little to husband kangaroos or ensure that they reap benefit from the kangaroos feeding on their land. On the other hand, landholders “can appropriate all gains from husbanding domestic livestock and can expand the number of these whenever this is profitable, even if the increase in profit [to the individual farmer] is less than the loss in collective profit from kangaroos.”

A cooperative approach would be needed for farmers to gain the best returns from kangaroos.

**Trade Between Zoos**

There is considerable demand for native animals for zoos, wildlife sanctuaries and nature parks, both within Australia and overseas. The suitability of animals and motivation for using them in this way varies.

Motivation may be essentially commercial or include primary objectives of public benefit through education and conservation of endangered species. Ventures that are essentially commercial may also achieve public education and conservation objectives as by-products of their commercial imperatives.

Endangered species may be kept and bred in captivity to ensure the survival of the species. For example, the government of Western Australia sells endangered species to zoos. Ideally conservation of a rare species will be concentrated on protection and restoration of its habitat. This will conserve its natural genetic character and behaviour as well as the species per se. Captive breeding can be expected to alter both genetic composition and behaviour. However, when a species is very rare and there is little chance of its recovery in the wild, captive breeding may be the only way to ensure that it does not become extinct.

The suitability of animals for use in captive displays and education programs varies with species. Some, like platypus, are highly sensitive to stress. These are not regarded as appropriate for any but the most carefully designed display.

One criterion which is used to assess the suitability of a species for uses that require captivity is its capacity to be bred in captivity. Unless it will regularly breed, its ability to adapt adequately to captivity must be questioned. Certainly such a species is likely to experience severe stress during capture and relocation. This is the view held by the Zoological Parks and Gardens Board of Victoria (ZPGBV) and is one of the reasons why the Board has so far refused to export platypus to overseas zoological parks.

The suitability of a species for use as part of a captive display depends, in part, on the conditions under which it will be kept as well as transported. It is probable that greater control over these conditions can be provided within Australia than for exported animals. Matching conditions of transport and captivity to the known needs of the species could increase the number of species accepted as candidates for live trade.

As with the platypus, rarity (or absence) of a species in captivity may ensure that it will command a high price on an overseas market. This same rarity may well reflect the vulnerability of the species to transport and confinement, except under conditions that
very closely resemble its natural environment. Unless such conditions can be assured, the species would appear to be ill suited to export.

The ZPG BV, with other leading Australian zoos and sanctuaries, does not sell or trade animals from its zoos. The primary object of moving animals through the worldwide network of zoos is to maintain the genetic integrity of populations. The Board donates and lends animals to zoos that it considers to be of a sufficient standard. It has an accreditation program and only deals with zoos that meet these standards. When animals are given or lent to overseas zoos, staff of the Board travel with the animals and stay with them until they are established in their new location.

**Tree-fern Harvesting**

In Victoria the soft tree fern (*Dicksonia antarctica*) is harvested under permit for use in ornamental horticulture. This species is suitable for wild-harvest as it will establish readily in damp soil from a section including part of the trunk and the fronds. The more hardy rough tree fern (*Cyathea australis*), though better suited to most gardens, cannot be relocated in this way. It can only be established readily from spores. Both species are commercially cultivated and sold in domestic and export markets, and are common and popular garden plants. They are also commercially propagated. However, the majority of ferns sold in Victoria are wild-harvested soft tree ferns.

The Committee was informed that, while the utilisation of tree ferns is heavily regulated on private land, thousands are bulldozed then burnt during tree clear-felling operations in State forests. Tree-fern operators, rather than see a valuable resource ‘wasted’, would like to harvest tree ferns before logging operations commence.

During a clear-felling operation, undergrowth, including tree ferns, is bulldozed to allow access to the trees. Once trees have been felled and removed, the bulldozed undergrowth (which can be up to 6 metres deep across the felling site) is either left where it lies, for subsequent burning, or is bulldozed into windrows and burnt. The purpose of clear-felling, rather than selective logging, is to mimic the destruction of the canopy and the understorey that occurs during infrequent wildfires. This allows the regeneration by removing most shade and release of nutrients. However, there is commonly a decline in understorey species, such as tree ferns, that normally resprout from vegetative parts after fire. These species are frequently damaged or destroyed during mechanical clearing. Other species, which need the shade provided by tree ferns to re-establish, are also disadvantaged.

Not all ferns die as a result of clear-fell logging operations and subsequent regeneration burning. It is estimated that 15 per cent of tree ferns survive on a clear-felled site, although further mortalities occur over subsequent years. Surviving tree ferns are considered to be an essential component of the recovery of the ecosystem, which is already under some stress as a result of the logging operation.
Current government policy is based on the belief that, if harvesting of tree ferns were permitted prior to logging, the combined operations would lead to a decreased survival rate of tree ferns in logging coupes. The survival of a number of upright tree ferns on a clear-felled site is essential to the recovery of the ecosystem.\textsuperscript{155}

The Committee notes that the DNRE has conducted research in the Victorian central highlands on partitioning logging coupes into different sections; a large area (92-98 per cent of the total coupe area) in which mechanical disturbance occurs; and other small areas set aside as machinery-free areas. The latter are referred to as understorey islands.\textsuperscript{156} The study found that in understorey islands 69 per cent of the tree ferns survived after timber harvesting.\textsuperscript{157} Tree-fern harvesting could possibly occur in the areas that are to be bulldozed while avoiding the understorey ‘islands’ if adequate area were to be set aside as islands. Although tree-fern survival on the cleared area would be reduced (possibly to zero) under the combined operations of harvesting and logging, survival over the entire coupe may be adequate to retain the integrity of the forest ecosystem, due to the presence of the understorey islands. What proportion of the coupe would need to be retained as islands and their desirable configuration would need to be determined. Certainly, based on research by the DNRE, it is likely to be more than 10 per cent and may be greater than 15 per cent.\textsuperscript{158}

\textbf{LIMITS TO KNOWLEDGE}

It is evident to the Committee that the key to sustainable harvesting is good management based on solid information.

Sustainable and efficient harvesting requires precise knowledge of processes controlling natural resources and involved in their utilisation. This information may then be incorporated into appropriate models upon which harvesting and management can be based.

Though there can be generalisations, knowledge of each situation is particular and poses specific management requirements.\textsuperscript{159} Furthermore, in basing management upon population models, it is of the utmost importance to keep in mind that the model is just that, a model, not reality. Models help to systematise available information into a form that is helpful to managers; they do not substitute for continued caution, careful monitoring of the impacts of utilisation and appropriate adjustments in line with the results of monitoring.\textsuperscript{160}

Many submissions and witnesses drew attention to the fact that availability of information on which to base decisions concerning utilisation of native species is far from adequate.\textsuperscript{161} This is in an absolute sense and in the availability of information in forms that can usefully guide decisions.
One of the greatest difficulties is the lack, or patchiness, of information on many species - how they interact within the natural ecosystem, what impacts management has on them and how they respond to utilisation.

A second difficulty is the transmission of information, where it does exist, to those who need to use it.

This proposal to create a new industry to utilise [native] flora and fauna begs the question who will train and supervise private landholders?162

The issue faced by natural resource managers and regulators, such as the DNRE, is that utilisation and management cannot necessarily be deferred until more adequate information is available. By way of illustration, the Department described its approach to the wild-harvest of the wildflower billy buttons:

It is difficult to do this [be sure that the venture is managed sustainably] in a new industry such as that. We ... go to the sites that are proposed for harvesting to ... try to get a picture of what has happened over time. By definition that is anecdotal. It is rarely the case that any research has been undertaken over any period, although quite often a proposal [to wild-harvest] will trigger some research.

In the absence of information we do not hold back from issuing a permit if the population seems to be large and if the practices over some years seem to be okay ... Clearly if there is regeneration and the actual size of the population seems to be reasonably stable, despite a proportion being removed, that is the absolute bottom-line monitoring. We call it surveillance monitoring - a quick look to get a rough idea of the population size.163

The approach used by the Department of Conservation and Natural Resources could be described as ‘adaptive management’. This, and other approaches to the challenge of inadequate information and research, are considered by the Committee in the next chapter.

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2 ibid., pp. 86-105.
3 ibid., p. 28.
7 Rabbits are particularly destructive because they eat plant roots and bark as well as leaves.
The cost of kangaroo proof fencing is about $1,800 per km – Department of Natural Resources and Environment, Minutes of Evidence, 3 May 1999.

9 Williamson, J. (1999), Department of Natural Resources and Conservation, Bendigo, personal communication, 18 May 1996.


13 VRFish, Written Submissions, No. U10; Bant, R. and La Varenne, D., Written Submissions, No. U21; and also Royals, S., Written Submissions, No. U24.


14 Australian Conservation Foundation, Written Submissions, No. U12.


18 ibid., p. 237.

19 ibid., p. 237.

20 ibid., p. 237; and also Bookmark Biosphere Trust (1986), Bookmark Biosphere Reserve Action Plan (Draft), Bookmark Biosphere Trust, Renmark, South Australia, p. 3 - 6.


24 ibid., p. 247.

25 ibid.

26 Aldenhoven, J. and Carruthers, G. (undated.), Kangaroos – Faces in the Mob, a film produced by Green Cape Pty Ltd., Sydney, NSW.


29 Culling for the sake of the species has been done in some National Parks when very dry seasons and limited habitat led to inadequate supply of feed for the resident kangaroo populations.


31 Animals Australia, Minutes of Evidence, 3 May 1999.


38 Lindsay, A. (ed.) (1986), Land Capability Assessment in Victoria, Graduate School of Environmental Science, Monash University, Clayton, Victoria.
Studies by the former Melbourne and Metropolitan Board of Works have shown that, even after clear-fell logging operations, the most persistent source of eroded material was from roads and tracks; eg. Langford, K. J. and O’Shaughnessy, P. J. (1980), *Water Supply Catchment Hydrology Research Second Progress Report Coranderrk*, Melbourne and Metropolitan Board of Works, Melbourne.

For example, see Biodiversity Unit (1993), *Biodiversity and its Value, Biodiversity Series, Paper No. 1*, Biodiversity Unit, Department of Environment, Sport and Territories, Canberra, ACT.


For example, the Murray cod has virtually disappeared from its former natural range in Victoria. The only viable population at present is found in a small section of the Seven Creeks river system (Euroa) - a translocation from a Goulburn River population in 1921 and 1922; Cadwallader, P. L. and Backhouse, G. N. (1983), *A Guide to the Freshwater Fish of Victoria*, Government Printing Office, Melbourne, p. 105.


Maroondah City Council, *Written submission, No. U 2*

Genetic engineering involves the artificial transfer of genes between species. As such it presents a substantial modification of natural biological evolution.


Eels Australis Pty Ltd, *Written Submissions*, No. U43.


e.g. Earth Sanctuaries, *Written Submissions*, No. U11.


ibid., p. 139.

ibid., p. 139.

ibid., p. 154.


Fisheries Victoria (1999), *Catch and Effort, Information Bulletin 1998*, Department of Natural Resources and Environment, Melbourne, Vic; and also Barker, J. (1999), Department of Natural Resources and Environment, personal communication, 31 August 1999.


ibid., p. 86.

ibid., p. 87.

ibid., pp. 247-248.


Cheshire, A. (1999), Senior Lecturer, Botany Department, University of Adelaide, personal communication, 11 March.


For example, Cowling, Y., *Written submission*, No. 22, and also; Australian Wildlife Protection Council, *Written submission*, No. U 60.


Preece, K., Department of Natural Resources and Environment, *Minutes of Evidence*, Melbourne, 26 April 1999.

104 Dolphin Research Institute Inc, Written Submissions, No. U68.
105 Hunt, N. (1999), Executive Director, Tourism Training Victoria, personal communication, 8 July 1999.
107 The Committee inspected the Penguin Parade facility during its study tour program.
117 Friends of the Earth, Written Submissions, No. 64; and also Australian Conservation Foundation, Written Submissions, No. U12.
118 For example Victorian Field and Game Association Inc., Written Submissions, No. 41; and also Victorian Game and Deer Stalking Association (VICGAME), Written Submissions, No. U47.

ibid., pp. 171-187.


NSW Farmers (1999), *Vegetarian Extremist out of her depth on Kangaroo Culling*, Internet site


ibid.


ibid., p. 205.

Centre for Conservation Biology, University of Queensland (1999), Internet site: http://www.ccb.uq.edu.au/website/; 19 January 1999, and also


ibid., p. 385.


ibid., p. 94.


ibid., and also


McClure, R. (1999), Manager, Experimental Area, Department of Biology, Monash University, Clayton, personal communication, 22 July 1999.

‘Mr Fern’ *Written Submissions*, No. U50.

State forests are public lands managed for forestry and recreational and conservation purposes; also

Mr Fern, *Written Submissions*, No. U50.

Mr Fern, *Written Submissions*, No. U50.


ibid.


Natural Resources and Environment, *Minutes of Evidence*, 26 April 1999; and also


Natural Resources and Environment, *Minutes of Evidence*, 26 April 1999; and also

156 Natural Resources and Environment, *Minutes of Evidence*, 26 April 1999; and also


158 Natural Resources and Environment, *Minutes of Evidence*, 26 April 1999 and also


160 ibid., p. 5; and also
Lindsay, A. (undated.), *Mathematical Modelling for Ecology, Environmental Discussion Paper*, Graduate School of Environmental Science, Monash University, Melbourne.

Australian Conservation Foundation, *Written Submissions*, No. U12;
Gott, B., Department of Biological Sciences, *Written submission, No. U7*; and
Royal Botanic Gardens, *Written Submissions*, No. U26;


163 Department of Natural Resources and Environment, *Minutes of Evidence*, Melbourne, 26 April 1999.
CHAPTER 8
RESEARCH AND KNOWLEDGE

• INTRODUCTION
• SECTOR-BASED RESEARCH NEEDS
• PROGRAMS OF SELECTED RESEARCH BODIES
• RESEARCH APPROACHES
• COMMUNICATION OF RESEARCH INFORMATION
• FUNDING

INTRODUCTION

While reviewing various sectors that utilise native plants and animals in Victoria (Chapters 3 to 6) the Committee became aware of the importance of research to the success of virtually all sectors. Moreover, as was described in Chapter 7, sound knowledge is vital to the ecologically sustainable management of these utilisations.

Analyses of factors affecting economic growth across different countries indicate that incentives to develop and take up new knowledge are important determinants of economic growth.\(^1\) Further, ‘take up of new knowledge’ requires that research be communicated effectively to those who must use it.\(^2\)

The Committee had occasion to speak with some of the key research staff of the Waite Institute of South Australia, one of the major agricultural and horticultural research institutes in Australia. In addition to generating new products and techniques, benefits of research and development, as identified in these discussions, included:

a) assistance with risk management by reducing the risks, including environmental ones, inherent in new industries;

b) assistance with time management - developing new enterprises always takes more time and effort than those involved expect; and

c) better planning and more efficient use of resources.

In this chapter the Committee considers research issues as they affect the major areas of existing and potential utilisation. Principal research bodies in Victoria and some in other States are described. Their potential for increasing knowledge about Victoria’s biota and its potential utilisation is indicated. The Committee then discusses a range of approaches to meeting the need for research and improving the transfer of knowledge.
A Brief Historical Perspective

Until the early twentieth century, wild-harvest was almost the only way in which native plants and animals were used.

Lack of Research into the Sustainability of Utilisation

Such early utilisation was undertaken in the virtual absence of research into sustainability. Similarly, population-control programs were based on very limited research. Market research may have been sound – products such as fur and oil sold well – but demand commonly led to harvesting rates that decimated populations of the targeted species. As a result, the industries did not last long at economically viable levels. Trade in fur seals and koalas are examples of industries that led to overharvesting, population crash and failure of the industries.

Lack of Research into Utilisation Potential

From the beginning of European settlement in Victoria, plant and animal production has been based on exotic species. Victoria has always had world-class agricultural-support research and extension programs - but these overwhelmingly gave emphasis to the traditional exotic crops and livestock. Very little attention has been given to the potential of native plants and animals. By and large, information on the incorporation of native species into agricultural systems has been based on the experience of farmers themselves, rather than on formal research. Information on the food and medicinal potential of native plants has relied heavily on information passed on by Koori people. The Committee regards such experiential information as being of considerable value. However, it also understands that such traditional and anecdotal information is both limited and seldom used as effectively as it might be for the good of the wider community.

The Committee’s investigation of Victoria’s research activity indicates that Victoria has the capability to undertake appropriate research into the utilisation of native species. Any failure to have done so is the result of a focus on exotic species rather than a lack of capacity.

Lack of Research into the Basic Ecology of Native Species

A colloquium held in 1984 on the food potential of seeds from Australian native plants concluded that the exploitation of native plants is severely handicapped by “our lamentable ignorance of Australian native flora and fauna and the natural ecosystems in which the have evolved.”

SECTOR-BASED RESEARCH NEEDS

Each major area of existing and potential utilisation has differing, yet often overlapping, research needs.
Horticulture Research

Having spoken to many of those involved in the floriculture and nursery industries, both in Victoria and elsewhere, the Committee has a clear understanding that the basic research requirement is the development of new cultivars (varieties) that are robust, attractive to the market and cost effective to produce.

While in Amsterdam, the Committee visited a number of importers and wholesalers of Australian flowers - all agreed that new varieties are always keenly sought, especially unusual and special plants. At least one Dutch wholesaler is ‘always interested in new Australian varieties.’ Other key factors for any variety sold is the quality of the product itself and the regularity of supply. Aalsmeer Flower Auctions, the largest flower market in the world, was visited by the Committee during its visit to Amsterdam. The importance of product quality was impressed upon the Committee. All stock passing through the auction rooms is subject to a rigorous quality-control process. The laboratory used for quality-control assessment is also used by growers for research into the longevity and durability of flowers and plants.

Likewise the Committee found that the development of longevity and durability of flowers and plants is a primary focus of plant research in Australia. With ornamental plants, methods of preparation for the market and preservation are important areas of development.

Wild-harvest-based sectors require information on the quality and reliability of supply of plants in particular. Other relevant research is concerned with the impacts of harvest on the sustainability of the target plant and other species that are affected by the harvesting process. Some research has been undertaken into potential economic uses of the excessive growth of a species due to ecosystem disturbance - the Committee was told of such research into use of coastal wattle and bracken.

The increasing use of cultivation-based forms of native-plant production leads to a different array of research needs. These relate to propagation, suitability of species or cultivars to specific climatic and soil conditions, disease and pest incidence and control, appropriate nutrient regimes and breeding and selection to improve the suitability of the plant for the selected purpose. All these aspects of production are, at best, in a rudimentary stage with native-plant crops. For many species they have not been addressed at all in relation to modern production systems.

An understanding of the dormancy mechanisms of individual species is required if high and consistent germination from native-plant seed is to be achieved. Alternatively, as was demonstrated to the Committee in relation to propagation of old-man saltbush, efficient vegetative propagation methods will need to be developed. Agronomic information on the native plants selected is also needed - for instance
some native species are intolerant of high soil-nutrient levels; others do well with additional nutrients.  

Native plants may have adaptations to help them cope with indigenous pests and diseases. These may not, however, be effective when the plant is grown under cultivation or in new locations. The vulnerability of many native plants to the root-rot fungus Phytophthera cinnamoni is testimony to this. Breeding, cultivation methods, quarantine, mixed-species planting and pesticides may all have a place in protecting native-plant crops. Producers need adequate information upon which to base their plant-protection regimes.

Appropriate areas for funding for crop-related horticultural research have been summarised by the federal agency - the Rural Industry and Development Corporation. They are:

a) plant improvement;
b) agronomy (plant production systems);
c) mechanisation;
d) pest and disease control;
e) extension (communication and education);
f) processing; and
g) market development.  

Research needs for the production of bushfoods are similar. These include:

a) management systems;
b) disease and pest control; and
c) cultivation requirements.

**Bushfood Industries**

Necessary research on plants and plant products that are intended to be used as food or as food additives includes studies on:

a) toxicology and nutritional value;
b) preparation methods; and
c) consumer acceptance.  

**Agricultural Systems**

Research into the incorporation of native species into existing agricultural systems has received a little attention to date, but there is potential for much wider use of such integration (for example saltbush and perennial grasses to feed sheep and cattle).

**Animal Products**

As with plants, some research needs apply, whether the animal is derived from the wild or cultivated. These relate to processing methods (for example maximising quality of leather from emus and use of possum fur in felt manufacture), and health
issues (for example benefits of emu products). Most research needs are, however, allied to the nature of production.

**Harvesting of Animals from the Wild**

A sustainable and successful harvesting operation of native animals from the wild is reliant on sound information. The experience of those involved in interstate harvesting programs of kangaroos indicates that research is required into the following areas:

1. size of population, distribution in relation to habitat and how these respond to environmental influences and management;\(^{14}\)
2. improved methods of survey and monitoring, particularly aimed at more accurate indexing of aerial-survey data;
3. quantification of actual impacts of kangaroo, wallaby and possum populations on availability of pastures for domestic stock, crop production, plantation establishment and native-vegetation communities under a range of habitat and weather conditions in Victoria;\(^{15}\)
4. for each species, impact of a known cull level over an extended period on population size and composition, hence sustainable harvest levels under Victorian conditions and improved models of off-take as basis for population management;\(^{16}\)
5. broader ecological impacts of harvest;
6. influence on the above factors of other herbivores, particularly of rabbits and insect pests; and\(^{17}\)
7. generic market research.\(^{18}\)

Information required to ensure sustainable harvesting of other species from the wild is similar.\(^{19}\) The Fisheries Research and Development Corporation adds the important requirements of:

1. effective information transfer; and
2. improved adoption of implications of research.\(^{20}\)

**Farming of Native Animals**

Research on conservation aspects of many species can provide a basis more direct utilisation of appropriate species, though additional research is needed.\(^{21}\) The Committee was told, during its inspection of the research facilities at the South Australian Research and Development Institute, that a very high priority for the farming of native animals, particularly fish, is basic information on species biology, food requirements and growth rates under a range of conditions.\(^{22}\) There is need also for more research directly related to the farming of native species other than fish.\(^{23}\)

Resources committed to such research are generally small relative to the potential value of production.\(^{24}\) For example expenditure by the Department of Natural Resources and Environment (DNRE) on research and development in relation to
fisheries (marine and freshwater) in 1997-98 was $4 million, with a further $5 million made available from the Murray-Darling Basin Commission.\textsuperscript{25} The value of commercial fishing to Victoria was estimated in 1997 as $100 million, and recreational fishing contributes at least as much again to the Victorian economy.\textsuperscript{26}

Other research needs noted in earlier chapters include studies into:
\begin{itemize}
  \item a) genetic selection of productive strains;
  \item b) the potential for, and control of, genetic pollution of wild populations;
  \item c) disease risk and methods of control;
  \item d) feeding options; and
  \item e) market research.
\end{itemize}

Ecotourism and Recreation
Sustainable tourism can similarly only be assured if it is based on adequate, well-designed and appropriate research and monitoring.\textsuperscript{27} However, it appears that, at least in Victoria, much of the current research, monitoring and survey work into ecotourism and nature-based tourism is done on an ad hoc basis, if at all.

Nature-based tourism research and information requirements, as suggested by various people, includes:
\begin{itemize}
  \item a) basic information on the size, economic contribution and impacts of the tourist industry;\textsuperscript{28}
  \item b) better profiles of the desires, expectations and needs of tourists seeking an experience based on native plants and animals;\textsuperscript{29}
  \item c) information on the natural species which are the bases of much nature-based tourism - by region and ecosystem type;\textsuperscript{30}
  \item d) potential demand for expansion of nature-based tourism;\textsuperscript{31}
  \item e) more-comprehensive information on where and what is provided for nature-based tourists and ecotourists in Victoria and how well this matches demand;\textsuperscript{32}
  \item f) the nature and degree of the environmental impact of tourists,\textsuperscript{33} and an understanding of which tourist activities relate to which impacts;\textsuperscript{34}
  \item g) least-cost ways to avoid, control or mitigate degradation;\textsuperscript{35}
  \item h) sustainable levels of use in different environments\textsuperscript{36} and maximum carrying capacity for tourist activities, determined using a system that has been shown to be appropriate for Victorian conditions;\textsuperscript{37} and
  \item i) economic data and analyses to underpin planning and management of tourism - including identification of effective ways to ensure that economic benefits are used in the local economy and to maintain the resource.\textsuperscript{38}
\end{itemize}

Bioassay
The Committee was given to understand that the efficacy of a plant or animal product often depends on the combination of agents in it rather than on any single chemical it may contain.\textsuperscript{39} Consequently, although testing of individual components as is done by
the AMRAD screening program is one appropriate approach to the search for medical applications of native species, it by no means explores all the opportunities that they present. The Victorian College of Pharmacology explained that they test the effects of the natural combination of substances in a plant in their pharmacological studies. There are no current studies of this type being undertaken on native species at the College, but work in this area is planned for the future.

The Committee understands that there is significant potential for an expansion of bioprospecting activities in Victoria. These could not only be aimed at medical applications, but also other forms of utilisation such as bioremediation of polluted sites and efficient conversion of waste products to useful substances such as fuels.

CSIRO staff involved in such bioassay work have identified a number of major challenges for their research:

a) access to native species - legal restrictions vary between States and the issue is difficult to resolve as there is a tension between concern that lack of restriction will lead to a loss of our natural resources to overseas developers, while too much restriction will stifle research and development within Australia;

b) the need to focus research so that limited resources can be used efficiently, but the risk this incurs of neglecting other fruitful areas of investigation;

c) the need for a coordinated national approach to ensure that the resources within native species are tapped for the benefit of all Australians, without compromising the long-term sustainability of species or ecosystems, and

d) issues of property rights.

Issues

The primary issue identified by the Committee in relation to sector-based research is that there are large gaps in current information. Critical information is lacking in relation to most forms of utilisation of native species. This information is needed if new developments are to be both ecologically sustainable and economically viable. Without a greater research effort, risks will be high and opportunities are likely to be missed.

Sound development of a new industry is dependent on good information relating to all stages of utilisation, from production (wild-harvest or cultivation) and processing to marketing. Ecological sustainability depends heavily on well-informed management.

The Committee also recognises that not all potential industries based on native species will be economically or environmentally desirable. Research can help to identify those forms of utilisation that are unlikely to succeed or may involve excessive risk, as well as those that are worth pursuing.

There are lessons in current and past programs concerning the most effective ways to target and conduct research. The Committee describes and analyses these in the
following sections. However, changes to the organisation of research programs will not remove the need for an overall increased research effort.

Resources, including finances and trained research staff, are limited. It may be necessary to devise new ways to ensure that these resources are provided.

PROGRAMS OF SELECTED RESEARCH BODIES

Despite the general acknowledgment that sound research and development work is essential to the success of developing industries, most of the utilisation sectors reviewed by the Committee still face significant gaps in required knowledge. The Committee was interested in the role that existing research bodies may have in generating the required information and the extent to which their current programs and processes may be of assistance.

The Committee has found that a range of ecological and agricultural research work is done within Victoria. Genetic research for pharmaceutical products or for genetic manipulation is also undertaken, as is some economic and market research with implications for the utilisation of native species.

Victorian Government and Associated Bodies

Arthur Rylah Institute

The research facility at the Arthur Rylah Institute at Heidelberg Research is part of the DNRE. It undertakes three main areas of research:

a) flora survey;

b) fauna survey; and

c) freshwater ecology.

Much of this work is aimed at identifying the distribution and ecology of key native species, and interactions within natural ecosystems subject to utilisation. An example of the Institute's research is a study of the place of tree ferns in regeneration of forest vegetation after logging and the use of unlogged 'islands' to retain habitat.45

The majority of the Institute's work on plants is funded by the Federal Government, under the Regional Forest Agreement process. The whole of Victoria is being surveyed and ecological vegetation classes mapped. For most of the State the mapping is at a broad-brush scale. However, more-detailed assessment of vegetation has been done under contract for Parks Victoria. The Grampians is one area that has been surveyed in some detail.46

The intention is to repeat the broad-brush surveys every five years to provide a monitoring tool for Victoria's flora. An estimation of the distribution of vegetation prior to European settlement is also being done. This is modelled on the basis of
remnant vegetation and features of sites such as soil, slopes and climatic conditions. These studies permit an evaluation of the impacts of modern land use.  

A key issue for the vegetation survey program is the need for an adequate, long-term commitment of resources to ensure that it is maintained.

The Institute also collaborates with the Institute for Horticultural Development (see below) by providing expertise in plant ecological research.

Research on native animals is mostly funded through the National Forest Agreement program to undertake surveys of fauna in relation to identified ecosystems. Victorian Government funding has been used to support faunal surveys of the box-ironbark country in north-eastern Victoria.

One of the current major projects of the Institute’s Freshwater Ecology Research Centre is supported by the Murray-Darling Basin Commission and involves studies of water quality and relevant ecological factors in the Murray-Darling system. The research is currently based on northern New South Wales. It is also investigating the ecology and ecology impact of carp.

**Institute for Horticultural Development**

The Institute for Horticultural Development is Victoria’s main research and development body involved in the development of plants for commercial use. It operates from two sites - at Knoxfield and Toolangi.

The Institute receives funding from the federal Rural Industries Research and Development Corporation (RIRDC), as well as State funding. State funding has decreased in recent years, with a push towards greater funding from industry. Of the Institute’s budget of $12 million, about half is from external sources such as Federal Government rural industry research grants and other external sources. About 175 people are involved in the Institute’s work.

In addition to recurrent funding from the State government and that from the RIRDC, the Institute also obtains income through initiatives such as Flowers 2000 (which aims to double Victorian flower exports from the 1995 figure of $5 million to $10 million by 2000-01). The Horticultural Research and Development Corporation matches industry funding for specific research projects.

The Institute’s focus is on servicing the horticultural industry. Activities include the development and release to industry of new cultivars, packaging systems, pest-management techniques and industry training. It has been estimated that the Institute contributes about 30 per cent of the national effort and resources into temperate horticultural research.
The Institute employs four industry managers, whose task is to ensure that the Institute’s work reflects industry priorities (involving both growers and exporters). One of the managers is responsible for the ‘ornamentals’ sector, which is one of the Institute’s key research areas. The research includes the development of native plants for the cut-flower and ornamental-horticulture industries. While the Institute works closely with industry, little contracted research is done.

Current research projects to the value of $320,000 are specifically aimed at the development of ornamental native species. These include:

a) developing native wattles (Acacia spp.) as an export cut-flower crop;

b) developing new Asteraceae (for example Chrysanthemum semipapposum) as cut flowers to complement the rice-flower industry;

c) development of fumigation techniques to improve the longevity of exported native flowers; and

d) evaluation of the commercial potential of the broom heath-myrtle (Baeckea behrii).

Such research responds to needs of the market - the majority of cut-flower and ornamental-plant exports from Australia are wildflowers, and world markets are constantly demanding new and unique plants. There is, however, only one researcher working specifically on native-flower product development.

The Committee inspected the facilities of the Institute and viewed the trial plots of tea-tree. It was told that plants with desirable characteristics are selected from the wild and then selectively bred by the Institute. While the technological knowledge of genetic manipulation is available, it is not used in the development of wildflower cultivars because of its expense and the largely untapped natural resource and natural variation within and between species.

**Marine and Freshwater Resources Institute**

The Marine and Freshwater Resources Institute (MAFRI) was established in July 1996 through an agreement between the DNRE and the Board of the Victorian Institute of Marine Science. This brought together under one administration two existing research facilities, one at Queenscliff and the other at Snobs Creek, Alexandra. It is incorporated within the DNRE. The major funding sources for the Institute are the Victorian Government and the Fisheries Research and Development Corporation.

Research undertaken at the Queenscliff facility is predominantly marine related, in line with the large contribution of marine fisheries to Victoria’s fishing industry. This is outside the terms of reference of the current Inquiry. However, work at Queenscliff does include the Statewide collection and analysis of ‘Catch and Effort’ information, which relates to both salt and fresh water species and is collected from recreational and commercial fishers. Analysis of these data indicates trends in the availability of various species and size of populations.
The Institute also undertakes analysis of its considerable resource of historical data, including that obtained from fish tagging.\textsuperscript{61}

The research activities at the Snobs Creek facility support the freshwater aquaculture, wild-harvest and recreational fishing industries. They are also concerned with maintenance of biodiversity in marine and freshwater habitats.\textsuperscript{62} Current research activities include:

\begin{itemize}
  \item[a)] studies of the genetic variation within Murray cod as the basis for selection for aquaculture production and maintenance of biodiversity;
  \item[b)] intensive aquaculture of the shortfinned eel;
  \item[c)] aquaculture production in saline inland water bodies and irrigation channels;
  \item[d)] assessment of the Department’s fish-stocking programs.
\end{itemize}

The DNRE’s current five year research plan highlights the difficulties all such facilities face in maintaining the long-term research needed as a basis for sustainable management of native species, while being responsive to changing circumstances, including availability of external funds. Five years is not a long time in which to undertake research on species which, in many cases, live for 20 years or more.\textsuperscript{63}

\textbf{National Herbarium}

The National Herbarium houses more than one million dried specimens of plants, including algae and fungi from Australia and overseas and is a fundamental resource for researchers of native-plant-based industries.\textsuperscript{64}

It also has its own research program, which is integrated with those of the associated botanic gardens. In addition to undertaking basic taxonomic research, some research is undertaken into the distribution, ecology and management of Victoria’s flora. The Herbarium also provides a limited plant-identification service.\textsuperscript{65}

\textbf{Victorian Zoological Parks and Gardens Board}

Research undertaken by the Board includes the reproductive biology of the platypus, and several other species.\textsuperscript{66} This research is aimed at more effective breeding and species-recovery plans. Studies concerned with the health of native animals and requirements to restore individuals to the wild are being done. The ecology of several native populations in the Healesville locality is being investigated. The Werribee Zoo is also undertaking studies on local native-grassland communities on which native animals in that area depend.

Funding for this research comes from the State Government, private donations and sponsorship and entrance fees.
Universities

A substantial amount of research relevant to the use and sustainability of native species is undertaken within Victoria’s universities.

Unlike the work of CSIRO, there is little formal coordination of this research except through the Co-operative Research Centre (see below). There is, however, considerable and effective coordination through informal networks. 67

University research is often of a more fundamental nature than that of other institutions. It is also somewhat more independent of external direction. As a result it has the capacity to provide the basic knowledge upon which more applied research relies. Examples provided to the Committee include a study of the feeding behaviour of little penguins. This research, undertaken by a Ph D student at Monash University in the early 1990s, has been used to show the relationship between penguin starvation and utilisation and habitat-alteration activity many kilometres from the breeding areas. 68

The Committee was also informed of the important role that research undertaken by a former member of the Monash University staff (now with the University of Adelaide) played in development of the kelp-harvesting industry on King Island. This research was undertaken as a fundamental study of kelp ecology. Studies on kelp are continuing at Monash University.

Applied research is also undertaken in universities. An example is work by the Graduate School of Environmental Science, Monash University. Its studies on ecotourism have been incorporated into a book, Australian Ecotourism, currently under review. 69 The recently formed Tourism Department of La Trobe University is studying high-country development. 70

Examples of other relevant university research are:

a) Monash University studies of human impacts on wetlands, streams and riparian vegetation, management of ecotourism, Aboriginal use of plants, the physiology and genetics of ‘resurrection plants’ (plants able to withstand extreme drought by a form of dormancy and respond quickly to rain when it occurs) and education for biodiversity; 71

b) Melbourne University studies of use of native species within conventional farming systems, genetic changes in native daisies under seed-orchard conditions, cultivation techniques for native plants and properties of emu oil; 72

c) La Trobe University has research on the impacts of tourism on alpine ecosystems and use of native plants to control dryland salinity; 73

d) Victoria University of Technology work on native food plants; 74 and
e) Deakin University extensive studies on native mammal biology and ecology as well as on the potential of aquatic organisms for use in detection of water pollution.  

The eclectic nature of university research, particularly that undertaken by postgraduate students, makes it important from the point of view of ensuring that the potential for novel uses has a chance of being detected. University research can also address sustainability issues that are unlikely to attract industry funding.

However, the nature of university research is changing. Reduced resources and increasing reliance on industry grants are reducing the capacity of universities to undertake research, particularly long-term, fundamental and independent studies. Increasingly research is undertaken in collaboration with industry or government research institutes.

Private Bodies

A number of private research bodies exist in Victoria. The Committee inspected facilities of AMRAD Discoveries Technologies Pty Ltd, which was established in 1993. It acquires and screens molecules obtained from natural products for potential pharmaceutically active products. It targets plants and micro-organisms. It currently maintains samples of over 240,000 natural-product extracts.

Felton Grimwade and Bickford Pty Ltd, which manufactures a number of eucalyptus-oil products, undertakes its own research in purpose-built laboratories. The Committee learnt of in-house research being undertaken by small companies involved in the growing and processing of bushfoods. The Victorian Emu Industry Development Committee sponsors emu research.

National Bodies

The Victorian native flora and fauna industry also benefits from the work of a number of national research institutions.

Australian Bureau of Statistics

The Australian Bureau of Statistics is a statutory body funded by the Federal Government. It collects the basic data from which information relevant to the utilisation of native plants and animals can be obtained, including information on industry sectors and employment. It also collects additional information on request and payment of an appropriate fee, through ‘supplementary questions’.

The Bureau undertakes much of the analysis of its data, but other research bodies also analyse its data for specific purposes - for example the Bureau of Tourism Research and universities.
Bureau of Tourism Research
Considerable research has been undertaken into various aspects of tourism in Australia by the Bureau of Tourism Research. The Bureau is based in Canberra and is jointly funded by the federal Department of Industry, Science and Resources and State tourism bodies - in Victoria's case, Tourism Victoria. The Bureau undertakes regular surveys of overseas and domestic tourist visits to Australia. It also surveys Australian households about their holiday intentions and undertakes other studies on contract.

Analysis of survey data has provided information on many aspects of the demand side of tourism, its potential for growth and its value to Australia. These surveys have identified attractions, including the native species (which are most important to tourists) and those localities most often visited. The character of ecotourism and interests of ecotourists have been studied. Tourists have been questioned about the importance they place on native species, other natural features of the landscape, and information on these features.

The Commonwealth Scientific and Industrial Research Organisation (CSIRO)
CSIRO has a charter to undertake research that serves to advance the long, as well as short-term sustainable development of agriculture and other industry in Australia. Sustainability is a central theme. While CSIRO’s research is applied in its emphasis, it is always based on an understanding of the fundamental systems involved. CSIRO has been responsible for world-leading studies on the impacts of greenhouse gases on climate change, the ecology of weeds, processes involved in soil degradation and the ecology of many native Australian plants and animals.

CSIRO is funded by the Federal Government, research grants (from organisations such as the RIRDC), industry and earnings from royalties and consultancies. A number of the consultancies are for overseas governments. An example is a study ‘Ectomycorrhizal Fungi for Eucalypt Plantations in China and Australia’. Ectomycorrhizal fungi have symbiotic relationships with the root systems of a large proportion of Australian native plants. They play a key role in the plant’s uptake of nutrients and are responsible for the capacity of many native plants to grow on nutritionally poor soils. Supplying the appropriate species of fungi to plantation-grown native species can greatly increase yields and reduce dependence on fertilisers.

CSIRO frequently undertakes its research in partnership with private companies, universities or government agencies. The Committee observed research undertaken in this way at the Waite Institute in Adelaide.
Several of CSIRO’s divisions are undertaking research relevant to the utilisation of native plants and animals. Areas include:

a) ‘Insect Bioprospecting’ – a joint venture with BioDiscoveries Ltd aimed at "collecting samples of insects and developing a library of extracts from them. The extracts are then screened for biologically active compounds that benefit human health or crop and animal production”;67

b) ‘Aquaculture’ (environmental management, breeding, nutrition);88

c) ‘Conservation Biology and Utilisation of the Australian Flora’;89

d) ‘Australian Flora Resource Management’;90

e) ‘Tourism’;91 and

f) ‘Pesticide Bioremediation’.92

CSIRO also has an important coordinating function. Projects such as its ‘Biodiversity Informatics’ aim to integrate information from many sources on biodiversity, species distribution and ecology.93

It has recently established a ‘Multidivisional Program’.94 The object of this is to assess the native plants, animals and micro-organisms contained in extensive collections that were obtained for a diversity of projects, for their potential in the production of pharmaceuticals, agricultural chemicals and nutrachemicals (dietary supplements with health benefits). Because the potential is enormous and resources are limited, the focus in this program is on a few key areas – for example pharmaceutical investigations are aimed at specific cancers.95 The difficult issue of choosing targets has been done in terms of national priorities. Existing knowledge, access to species for investigation and legal constraints provided an initial filter on possible projects. Priorities have been identified through consultation with industry.

The Committee was told that CSIRO’s Multidivisional Program cannot be expected to do more than identify a few of the potential uses of native species. The hope is that the work of this program will provide a model of how integrated and targeted research can be undertaken. However, it is early days for the project and its potential has yet to be realised.

Coordinating Bodies

The Committee has described the coordinating function of CSIRO. The importance of providing coordination and direction to research is recognised by both governments and the research bodies themselves. Several organisations have been established to facilitate the coordination of targeted research. The Committee investigated two that have particular relevance to this Inquiry.

Fisheries Research and Development Corporation

The Fisheries Research and Development Corporation (FRDC) was set up as a statutory corporation in July 1991. The Corporation supports a range of research
programs aimed at advancing sustainable industries based on Australia’s aquatic resources. The Corporation recognises that sustainable use of aquatic resources depends, in part, on managing ecosystems. Its objective is, therefore, to meet the challenge posed by:

The [current] poor understanding of how fisheries ecosystems work and how their use - or other disturbances or economic activity - affect them ... including how to improve the selectivity of fishing methods, how to minimise environmental harm caused by fishing gear, and how to maximise the use of bycatch.97

The Corporation encourages operational links between research institutions and funding bodies. In selecting projects to be supported it also takes advice from relevant management agencies and industry sectors. As a result, the research supported by the Corporation is usually closely related to the immediate commercial needs of industry. It is the Corporation’s expectation that involvement of stakeholders will also lead to effective implementation of the results of the research that it supports.99

The majority of projects supported by the Corporation are concerned with marine or estuarine fisheries.100 Some of their research is relevant to freshwater species, for example:

a) studies of the nutritional benefits of fish oils;101
b) assessment of juvenile eel resources in south-eastern Australia (research undertaken by the Marine and Freshwater Resources Institute, Victoria);

c) description of the biology and an assessment of the fishery for adult long-finned eel fisheries;

d) development of an artificial neural network for automated age estimation (research undertaken by the Marine and Freshwater Resources Institute, Victoria); and

e) optimising the efficiency of enforcement in commercial fisheries.102

**Rural Industries Research and Development Corporation**

The Rural Industries Research and Development Corporation (RIRDC) is a statutory body established under the Federal Primary Industries and Energy Research and Development Act (1989).103 Its charter is to coordinate, manage and fund priority research for Australian rural industries and translate results into practical outcomes for industry.104 It works closely with rural industries on the selection, organisation and funding of research and development. As expressed by RIRDC:

[Its] business is about new [rural] products and services and new and better ways of producing them. 105

Work is undertaken by established researchers, often staff of government agencies, universities or CSIRO. Collaboration between research bodies is encouraged and commitment by the research organisations involved to provide significant funds or in-
kind support is often required. In this way the RIRDC has fostered applied research. It has been a key catalyst in the rejuvenation of interest in alternative agricultural products, including those based on native species. The initiation and viability of many State programs have relied on RIRDC funding.

The Corporation has played a key role in the development of wildflower industries by establishing a range of research, development and extension activities, including an investment of $4.1 million nationally in its wildflower and native-plants program since 1991-92.

Other funded areas of research and development that are related to native flora and fauna include:

a) commercial use of wild animals in Australia;
b) pharmaceutical application of products;
c) impact of government policies on native species industries;
d) marketing issues;
e) economic issues;
f) farming (including aquaculture) of native animals; and
g) native plants for cropping.

The RIRDC also organises conferences and workshops as a mechanism for stimulating and directing research as well as integrating and disseminating information.

Corporation-funded programs now require an industry contribution of 25 per cent and greater industry contribution to research is advocated by the Corporation. It is also promoting an innovative approach to research through its ‘Do Our Own Research Project’ programs. Such programs empower growers and propagators, providing them with the skills to undertake their own research. This reduces their dependency on advisers and consultants. It helps them to appreciate better the application of research to their specific situation and tailor it to their needs. To date there has been minimal uptake of the program by Victorian producers.

**Cooperative Research Centres**

Cooperative Research Centres (CRCs) provide coordination and focus for research and research extension. They receive funding from the Federal Government in recognition that, by bringing together strategic research, they value-add to individual research products. CRCs are commonly organised on the basis of ‘nodes’, or groups located within a particular region. The benefits of financial or other contributions are amplified through CRCs by matching federal grants and synergisms that are produced by coordinated, well-planned and focussed research and development.

Several CRCs are involved with research that is relevant to the utilisation of native species.
The Cooperative Research Centre for Sustainable Tourism was established a little over two years ago to provide strategic research and information for the tourist industry in Australia. Its headquarters are at Griffith University in southern Queensland. Some of its work relates to native species-based tourism. Examples are *Best Practice Environmental Management for Nature Tourism on Public Lands and International and Domestic Market Analysis of Wildlife Tourism* These are being undertaken by Griffith University.

None of the CRCs’ tourism projects on nature-based tourism are based in Victoria. There is a Victorian ‘node’, but this is focussed on ‘events tourism’. According to the Director of this ‘node’, this is basically a response to the interests of the associated Victorian organisations. Should these organisations see a need for research and development in nature-based tourism the ‘node’ could expand its activities in that direction.

The CRC for Food Industry Innovation and that for Freshwater Ecology are the other two centres which have the greatest capacity to facilitate collaborative work on utilisation and sustainability of native species. The former fosters research into, among other things, the development of novel food colours, flavours and ingredients from micro-organisms - it is based at the University of New South Wales in Sydney. The latter centre is a consortium of five organisations including Monash and La Trobe universities.

**Selected Interstate and International Bodies**

*University of Adelaide*

On its study tour to South Australia, the Committee learnt of an array of research being undertaken by the Adelaide University, particularly through its affiliated Waite Research Institute. Much of this research is being carried out in collaboration with the State government agency, Primary Industries and Resources South Australia.

**Programs included:**

- **a)** basic taxonomic research - for instance into kelps;
- **b)** industry trends and sustainability - for example, studies on the King Island kelp industry;
- **c)** applied management programs - for example the preparation of seagrass management plans;
- **d)** selection, propagation and pruning techniques of banksias for cut-flower production;
- **e)** propagation of eucalypts for cut flowers, and associated research into, for example, controlled pollination and storage techniques; and
- **f)** eucalyptus essential oils research, including species and genetic selection, large-scale planting and harvesting techniques, and land-rehabilitation applications.
**Plant Research Centre, Waite Institute, South Australia**

The South Australian Government appears to place great emphasis on research as the precursor of agricultural activity. The Plant Research Centre is a collaborative effort between the Adelaide University, CSIRO and the Department of Primary Industries and Resources of South Australia. The development of new cultivars of native plants has been a focus of research for a number of years – this type of research has been found to require adequate resources and time. Some 45 per cent of the Centre’s funds are sourced from industry and there is a close relationship with growers.

Current areas of research (being undertaken by Ms Gayle Barth) include:

a) cultivar and production development of the Sturt desert pea;

b) cultivar development of Geraldton wax;

c) field assessment, yield increase and plant-line development of Ixodia - for cut flowers and pot plants;

d) production techniques – hot-house technology, hydroponics, etc.; and

e) screening of *Banksia cossinea* and *Eucalypt spp.*

Marketing research is an integral part of industry-development research.  

According to the Dean of Agriculture, University of Adelaide, South Australia’s history of collaborative research and development is perhaps the key lesson of that State’s high level of success in developing agriculture South Australia.  

The Waite Institute has played a large part in South Australia’s research and development of natural resources. It has:

a) a history of collaboration, which has produced a culture of cooperation;

b) the purpose-built Waite Institute precinct has facilitated successful collaboration; and

c) location of research staff and facilities on the basis of project rather than employer organisation facilitates effective collaboration and efficient use of staff and resources.

**Aquatic Sciences Centre, South Australian Research and Development Institute**

The Committee visited the Aquatic Sciences Centre, South Australian Research and Development Institute (SARDI) to obtain information on their aquaculture programs.

The South Australian Research and Development Institute is a business group of the South Australian Department of Primary Industries and Resources. Its research activities include studies related to aquaculture and wild-harvest of inland fish species. It also acknowledged that adequate knowledge on which to base management is not available yet for most native species. However, together with industry, the South Australian Government has developed strategic research and development plans in relation to its aquatic resources.
The Institute is actively involved in communicating results of its work to clients. It has client managers who mentor new entrants to the industry.

South Australia’s freshwater aquaculture is expanding. The vigorous research and development that supports this industry, allied to an affirmative government policy, appear to be key contributors to its success. The main South Australian aquaculture species are yabby, marron, barramundi and Murray cod.

**Israeli Case Study**

The Committee had opportunity to inspect a number of Israeli research institutions and field stations during its study tour of the country early in 1999.

The Committee discovered that Israel has an attitude of nurturing research and development (Israel has 145 engineers and scientists per 10,000 employers compared with the Australian ratio of 60 per 10,000 employees). The Committee was told of Israeli studies suggesting that there is a return to Israel’s economy of 2.6 shekels (the Israeli dollar) for each shekel invested in agricultural research.

The Israeli Government, in collaboration with industry, plays a strong role in providing both clear direction and funding for research. As far as agricultural research is concerned, the driving incentive has been to create productive agriculture from a semi-arid environment - because the nation saw this as necessary for its survival. Notable successes described to the Committee were the development of irrigation systems and arid-zone agriculture. Molecular biology and genetic engineering are focal areas for current research. The objective is to create higher-quality products and higher yields.

Horticultural research includes the evaluation of new cropping species (some species derived from Australia) and the manipulation of planting and flowering dates. Increasing export potential is the key aim (especially to take advantage of the poor flower-growing season during the Northern Hemisphere winter).

The Committee noticed Australian wildflowers being grown at virtually all research centres and flower farms that it visited. They are sought because of market interest. Seeds of Australian wildflowers are obtained from naturally occurring sources, but patents are taken out by the Israeli research body on any Israeli improvements or new varieties.

**Agricultural Research Structures**

The Israeli Agricultural Research Organisation (ARO) - a public sector body - carries out approximately 75 per cent of agricultural research in Israel. It incorporates seven institutes. Its role includes provision of extension services.
A Government Chief Scientist sets three-year ‘national interest’ funding priorities. The Government pays for the buildings and the salaries. Research funds come from competitive bidding for public funding (from the Office of the Chief Scientist and from Production Councils), industry funding or international foundations or endowments. Private companies do not undertake in-house research.

Every farmer is legally required to contribute 0.6 per cent of income to the ‘Production Councils’, which are made up of equal representation of farmers, scientists and extension officers, who fund research according to defined priorities. In addition to the farmers’ levy, flower farmers, through a ‘Flower Production Council’, invest additional monies into research.

The Agricultural Research Organisation also undertakes mariculture research - including a project to introduce Australian freshwater crayfish to Israeli aquaculture. The Agricultural Research Organisation has a tradition of international joint projects as well. The Agricultural Research Organisation told the Committee that it is interested in joint projects with Australian scientists.132

An integral part of the Israeli agricultural research program is a series of regional field research stations. The field research stations are very much focussed on applying and creating research data to meet local farming needs. For instance the development of brackish water-irrigation techniques is a key area of research at the Ramat Negev Desert Agro-research Centre, which services an area where freshwater supply is extremely limiting. Research included that into production methods for Australian wildflowers. This approach ensures close links between researchers and farmers, and facilitates the dissemination of research findings to the users.

The field research stations are operated by consortia of various combinations of municipal government, non-government organisations (notably the Jewish National Fund - a non-government organisation that acts as the country’s largest land management and development organisation), universities and the Ministry for Agriculture.

Issues

The Committee notes that there are a number of relevant research programs in Victoria. However, the level of commitment to development of native Australian species that the Committee observed in both Israel and South Australia is not matched in Victoria.

Research that is being done is at times poorly coordinated and short term. The former concern is being addressed to some extent by the commitment to well-targeted research by CSIRO, bodies such as the Rural Industries Research and Development Corporation, the Fisheries Research and Development Corporation and the various Collaborative Research Centres. The Standing Committee on Fisheries and
Aquaculture has prepared guidelines for integrated research for Australian fisheries and aquaculture. The experience of these bodies makes it clear that, if research is to be efficient, it must be coordinated and focussed; but providing coordination and focus itself requires resources.

Involving stakeholders in the development and implementation of research programs is widely seen as the key to research that is relevant and effective. However, it can be difficult to identify all stakeholders and involving them in research programs.

**RESEARCH APPROACHES**

A number of approaches to research are possible, and for many issues a range of approaches is needed. Such approaches include:

- adaptive management;
- amateur and semi-professional research;
- applied research;
- basic biological resources survey;
- collaborative research;
- interdisciplinary studies;
- international cooperation;
- pure research;
- researcher-industry partnerships;
- scoping studies;
- statistical information; and
- traditional information.

Each method is briefly described below.

In addition the issue of commercial versus non-commercial research has been raised with the Committee. The Committee received evidence, in the context of differences in regulatory responses according to whether research was ‘commercial’ or ‘non-commercial’, suggesting that there were “few pure examples of non-commercial research”. The view put was that while, for example, some museum and university research could be considered as ‘non-commercial’ (such as taxonomic research), most would not:

- Universities often apply for scientific permits to take animals from the wild for drug investigations, thus avoiding a high royalty for commercial use ...
- They often carry out research and sell the IP [Intellectual Property Right] they develop.

As has been previously described, public sector and university research often consists of pure research or orientated for application for an industry sector, with the results generally placed in the public domain. The contribution by private-industry research to the knowledge of native flora is acknowledged by many. However, it seems that
much of the research results are not in the public domain, but bound by commercial
in-confidence restrictions.

**Adaptive Management**

Adaptive management has been described as ‘learning by doing’. It involves:

a) strict and thorough monitoring;
b) careful record-keeping and continuous analysis of data provided by monitoring;
c) the capacity to make responsive changes;
d) adequate knowledge to know when and how changes should be made; and
e) mechanisms to ensure that these are made as needed.\(^{137}\)

It is one response to the lack of realism of research isolated from practical
management, the need for long-term studies and pressure to initiate utilisations before
everything is known in relation to them. Ideally adaptive management should take
account of institutional and socio-economic factors as well as ecological ones.

The Senate Inquiry, in recommending that “the Federal Government investigate the
possibility of an experimental management trial (of replacing traditional stock with
native wildlife in marginal grazing land)” was advocating an adaptive management
approach.\(^{138}\) Others have also advocated this approach, believing that lack of detailed
information about a species should not be used as an argument against the
commencement of commercialisation on a trial basis”.\(^{139}\) The trial then provides the
knowledge needed to improve management.

Adaptive management has been advocated for wild-harvesting:

> As circumstances and knowledge continually change all wild harvesting and
use of wildlife should be managed adaptively.\(^{140}\)

A problem with the approach is that, once utilisation has commenced, it is difficult to
terminate it, even if trials indicate that this should happen. A second problem that can
arise is that even trial utilisation may have an unacceptable impact in some cases. This
is most likely in fragile ecosystems, with rare species or where utilisation has impacts
that are hard to detect.

**Amateur and Semi-Professional Research**

Several submissions drew attention to the valuable role that amateur and semi-
professional individuals and groups can play in increasing knowledge of native plants
and animals.\(^{141}\)

Amateur naturalists can and do contribute to knowledge of native flora and fauna.
They may contribute basic information on the distribution and abundance of species,
as well as on more complex ecological relationships. Amateur naturalists may also be
able to provide such information for remote areas not otherwise readily accessible by
professional researchers.
Such contributions may be substantial - it has been estimated, for example, that the contribution of amateurs to our understanding of Australian reptiles is around 20 per cent.\textsuperscript{142} The value of non-professional research is acknowledged in the Senate Inquiry Report.\textsuperscript{143}

Members of specialist groups of the Field Naturalists Club of Victoria have contributed substantial information to scientific research and conservation planning, much of which is published. Members of the Club of Victoria have, for instance, collaborated over many years with Dr R. Parsons of the Botany Department at La Trobe University (Bundoora Campus) to prepare a database of the distribution of Victorian flora.\textsuperscript{144} Members of the Latrobe Valley branch have been consulted regularly for advice, upon which the declaration and planning of floral reserves has been based over many years.\textsuperscript{145}

Amateur researchers consider that current regulations are unnecessarily restrictive and seek their modification to make it easier for amateur naturalists to undertake research and also support to assist with the collation and interpretation of this research.\textsuperscript{146}

Issues for amateur research can be difficulties in insuring that information is collected in a rigorous way and in coordinating the research.\textsuperscript{147}

**Community-initiated Research**

There is a continuum between amateur and professional research. This is exemplified by two organisations that made submissions to the Inquiry - Birds Australia\textsuperscript{148} and the Dolphin Research Institute.\textsuperscript{149}

Birds Australia (the trading name of the Royal Australasian Ornithologists Union) is a not-for-profit organisation of professional and semi-professional bird enthusiasts. It is “involved with and manages a number of major research ... projects”.\textsuperscript{150} These include surveys undertaken by members. The organisation also publishes the scientific journal *Emu*, which focuses on the results of research into birds, their life cycles, behaviour, ecology and conservation.\textsuperscript{151} Through its activities, Birds Australia encourages research on Australian birds, dissemination of information based on this research and increased community interest in birds.

The Dolphin Research Institute grew out of community interest in dolphins in the waters near Melbourne.\textsuperscript{152} This led to the formation of the Institute, which is now an ‘Approved Research Institute’ for taxation purposes (donations to the Institute are deductible). It focuses on both research and education and it taps community support in terms of funding and logistic support. As an example of the latter, its researchers actually travel on dolphin-tour boats to study the impacts of these tours on dolphins. The institute also offers ‘summer scholarships’ to new graduates to provide them with experience in research.
According to the Director, the Dolphin Research Institute’s practice of providing information on dolphins and their habitats free of charge is a reflection of its focus on its primary objectives. These are best met by ensuring the widest possible dissemination of the Institute’s findings.\textsuperscript{153}

The Dolphin Research Institute is financed by a number of private sponsors and donations. It believes that community support for other research on native species could be tapped with limited government encouragement.\textsuperscript{154}

**Applied Research**

Applied research is aimed at dealing with a specific practical issue. The Committee observed such research during its inspection tours of Israel, South Australia and the Institute of Horticultural Development – Victoria. Issues concerned included:

a) the need to develop strains of plants or animals which provide consistent and higher yields;

b) production of flower forms which meet a range of consumer preferences and are robust under conditions of transport;

c) disease resistance in cultivated species.

**Basic Biological Resources Survey**

Despite the relatively small size of Victoria, and some 200 years of European study and 40,000 years of Aboriginal experience, the distribution and indeed identification of many groups of plants and animals are still poorly known. The number of species for which detailed ecological and biological research is available is limited, even for native mammal species.

With respect to potential utilisation of native species, biological resource surveys may use existing surveys of plants and animals but would have a different focus; that is their concern would not be on simply identifying what is there, but what resources for sustainable human use can be identified.

**Collaborative Research**

Collaboration between researchers and research institutions promotes efficiencies and permits the multidisciplinary teamwork commonly needed in relation to utilisation of native species. As was outlined above, the Cooperative Research Centres promote such collaboration, as it was found that collaboration ‘value-adds’ to individual research.

Collaborations between industry and research bodies ensure that research addresses the needs of industry, while ensuring that the results of research are communicated effectively to the potential user. Such collaborations put the resources of industry at the disposal of the researchers. This may involve funding, but equally importantly may include equipment, materials and data records.
Sharing of facilities by several research bodies increases the opportunities of each. Even more important is the pooling of intellectual resources, information and ideas.

During its study tour to South Australia, the Committee learnt about the very successful collaborations based on the Waite Institute (which is part of the University of Adelaide) and the South Australian Research and Development Institute (which is a business group of the South Australian Department of Primary Industries and Resources). This model of collaborative research is based on researchers from different bodies working together at a single location - the Waite Institute provides a purpose-built precinct on which research and policy staff of the CSIRO, the government department and the University of Adelaide are co-located.

The advantages of this model are that it has produced a culture of cooperation and enables the location of research staff and facilities on the basis of project rather than employer organisation and thus facilitates effective collaboration and efficient use of staff and resources.

Another model is that of the CRCs, as previously described, which brings together researchers for joint research projects, but at multiple locations.

Informal collaboration is very common. This is a response to common interests and objectives. It is often the outcome of workshops, conferences and similar opportunities for research workers to meet and share interests.

Approaches to funding used by organisations such as the Rural Industries Research and Development Corporation also recognise the value of collaborative research. The requirement of some of these funding bodies that those seeking support obtain collaborators also promotes collaboration.

An issue that may arise, however, is that collaboration can conflict with the desire of one organisation to retain all the commercial benefits of its work. CSIRO has described how it deals with this by ensuring that clear contracts are entered into at the beginning of a collaborative venture. It is an issue that can, nonetheless, inhibit collaborative research.

**Interdisciplinary Studies**

Interdisciplinary studies are often needed to identify the potential of native species or their extracts for various uses. For example information on species biology, ecology, toxicology, nutritional value, market potential and social impacts may be required. A research team may ideally require input from economists, marketing experts and rural sociologists as well as scientists. These other disciplines are needed to ensure that applied research programs are practical in terms of economic sustainability and relevance to the circumstances of land managers.
The Committee noted several examples of the need for multidisciplinary research during its study tours. Plant breeders, agronomists and marketing experts were all engaged in the development of new strains of native ornamental plants at the Waite Institute.

For example some plants, including soil micro-organisms, appear to have developed chemical repellents which protect them from attack by insects. The mechanisms involved are not known but could provide a lead to powerful insect-repellent chemicals. Disciplines which would need to be involved in developing this utilisation would include soil science, biochemistry, microbiology, toxicology and entomology. Examples such as this suggest that collaboration between various branches of ecology and the disciplines more conventionally engaged in plant breeding, pharmacology and biochemical research could be profitable.  

**International Cooperation**

The Committee learned, during its study tours to Israel and the Netherlands, that more development and production of cultivated cut flowers using Australian species is done in Israel than in Australia. The cultivars developed reach the European market, largely through the Netherlands. It is difficult for Australia to compete for access with these countries because of their proximity to the market.

Primary Industries and Resources South Australia (PIRSA) has decided that, rather than attempt to compete, a collaborative approach can be used. Department representatives explained to the Committee that the Department is negotiating a collaborative venture with private enterprise in Israel to export native Australian plants to Europe. Australian expertise and plant diversity (on the basis of royalties) are the products being exported.

A similar approach might be used by other States. The Committee considers that, for this approach to be successful, there must be good cooperation between States. Many native species are not confined to one State and it is essential that overseas interests not be given the opportunity to play one Australian State off against another.

Another approach identified by the Committee was the use of memoranda of understanding. The Committee was briefed on the memorandum of understanding between the Victorian Department of Natural Resources and the Environment and the Jewish National Fund (the major land manager in Israel) and noted the potential and mutual advantages that such two-way relationships offer.

**Pure Research**

Pure research is most commonly undertaken by institutions such as universities, and at least in the first instance, is mostly of a non-commercial nature. While often highly
specific, it can and does lead to an array of applied applications. Such research may be reliant on access to wild or captive/cultivated populations.

Feeding and social behaviour and reproductive biology research is often undertaken on captive populations but nonetheless “can be enormously informative when attempting to understand the ecology of wild populations”. Ultimately, however, wild populations must be studied if they are to be understood and managed. “The more we learn about our ecosystems the better equipped we are to manage and preserve them”. 157

Research utilisation of wild populations of wildlife may take many forms, including:

Simple observation, capture and release, radio tracking, the establishment of permanent captive colonies, and occasionally the removal and killing of animals from the wild. 158

An example of the usefulness of fundamental research is the research into the structure of organic chemicals. The fundamental research identified molecular structure that is associated with biological activity. Screening identified other chemicals with similar structure and therefore a likelihood of similar biological activity.

**Researcher-Industry Partnerships**

At the first Australian ‘New Crops’ Conference in 1996 it was noted that:

It takes a long time to develop a totally new crop so we need to plan for both the market place and the farming technology ... and find ways to shorten the development period. 159

One suggested response to this issue, a suggestion supported in various forms by a number of speakers at the conference, was:

A partnership between farmer and researcher [as it] has the potential to cost-effectively develop a relevant production technology and to short-circuit the traditional extension phase, bringing the crop to the market sooner. 160

This approach has, in effect, been applied through Landcare groups. The Warrenbayne Boho group, in partnership with the (then) Department of Conservation and Environment, developed a demonstration/research program on the property of one of its members. Such an approach can help to address the issue raised above of tapping farmers’ experiential knowledge.

Similarly, land managers can be the repositories of much useful information gained through their day-to-day experience. The value of this experience to provide information directly and to suggest fruitful lines of research is often overlooked. 161

The Committee considers that better mechanisms for tapping this information are needed.
According to the National Ecotourism Accreditation Program, an efficient approach to establishing research priorities and gathering together existing information, is for the interested agencies and organisations to provide seeding support for an initial scoping workshop. The workshop would bring together industry, government agencies and research organisations. This coordinates existing knowledge and identifies those areas of research that are most needed and will provide the best returns.

This approach has been used with considerable success by the Co-operative Research Centre for Tropical Pest Management and Queensland University, CSIRO and various other CRCs. A recent workshop, ‘Domestic Markets Revealed’, was organised in Melbourne by Tourism Victoria with several other Melbourne-based tourism organisations. This workshop pooled information on the domestic tourist market in Australia and used it to provide direction to the tourist industry. Many of the RIRDC research programs have also successfully used the workshopping approach.

A variation of such approaches is that of the consultative program which brings together staff of Fisheries Victoria, DNRE’s regional management and Biodiversity Branch staff, the Marine and Freshwater Resources Institute and representatives from the Victorian recreational fishing peak body, VRFish. This group’s activities include collation of information and making recommendations concerning stocking and management of recreational fishing resources.

**Scoping Studies**

Research on potential new uses of native species involves risk. It is inevitably long-term and costly. Consequently those responsible for research and development funding increasingly assess potential industries for their likely chance of providing a direct return to the community. Use of assessments or scoping studies can assist in ensuring that funding is well targeted. Research and development needs are often multi-disciplinary, requiring consideration of social, political, economic, physical and biological factors.

The Committee noted that scoping studies are an effective tool for identifying the most efficient projects in which to put major research and development effort. They reduce the risk of wasting research and development resources and of failing to provide the support needed to initiate new industries with real potential for success.

These studies can be relatively inexpensive and undertaken rapidly. They depend mainly on existing data to provide information on factors such as the likely success of a new industry or information deficiencies limiting the industry. Such studies ideally involve the survey of relevant industry members or potential members and other stakeholders and indicate what research and development is most likely to achieve benefit-cost ratios greater than one.
An example of such scoping research is the RIRDC’s ‘New Crops Study’. This study used industry-supplied information to determine those factors that inhibit and assist the success of new industries. Results clearly established the importance of research and development and also indicated the nature of research needed.

Scoping studies have been used by the RIRDC to identify where future major research effort can most profitably be undertaken.

**Statistical Information**

A key factor in the successful funding and targeting of research programs is the availability of current and reliable statistical information on the industry itself: its size, value and products. Without this information it is very difficult to analyse trends, to justify research expenditure and to determine where research efforts should be directed.

Most sectors of utilisation do not, however, have a well-developed system for the ongoing data collection be implemented that uses accurate and uniform definitions of product categories.

The Committee notes that a research and development levy on native-flower exports has been proposed by some in the industry. Imposition of such a levy would necessitate better disaggregation of data based on the State of origin, quantities and types of flower exports from Australia. As noted by a recently completed report by the Cut Flower and Nursery Industries Regulatory Reform Task Force, through the Office of Regulation Reform, Australia is one of the few developed countries that do not have statutory reporting requirements for its cut-flower and nursery industries. The Task Force reported that the Nursery Industry Association of Australia has been working with the Australian Bureau of Statistics to develop an industry reporting census form. The report suggested that:

> industry associations, in conjunction with the Department of Natural Resources and the Environment, give consideration to the development of a census form and identify an appropriate agency for the collection of data.

**Traditional Information**

Indigenous Australians supplied all their day-to-day needs from native plants and animals. Consequently they can provide the first line of information on their potential uses in present-day society.

A vast amount of information on the use of plants by Koori people has been collected and analysed by the Department of Biological Sciences, Monash University. Similar information has been collected by researchers in other States.

A mechanism to ensure that traditional knowledge is documented and securely stored is needed.
Issues Concerned with the Research Approach

The Committee notes that there are benefits to be gained from a diversity of research approaches. At the same time, it has already drawn attention to the desirability of focussing research effort on those areas where a need for information has been identified or utilisation of native species has most potential for success. Yet the Committee also notes that overly directed research is likely to miss valuable information. Balancing the need for focus and efficiency with the potential of less-restricted research may prove difficult, especially where research funding is restricted.

Information gathered in isolation from commercial-scale utilisation may not reflect accurately the ecological impacts of utilisation. Furthermore, long-term studies are often needed to determine the ultimate effects of utilisation, which can be complex and unexpected. For these reasons it is difficult to delay every utilisation until all the necessary information is available.

The adaptive management approach may offer a solution to this difficulty, but is not always applicable. Setting up a commercial-scale operation may be expensive and incur the risk of undesirable impacts that need to be assessed before any production commences.

The close alignment of policy-makers and industry with researchers appears to be a critical success factor of the South Australian and Israeli approach to research. Such an alignment also has the benefit of ensuring that research is targeted to achieve the most efficient use of resources. The level of commitment and the application of resources to such approaches seem to the Committee to be somewhat lower in Victoria. There appears to be a range of mutual benefits to be gained from the fostering of such close collaboration.

Finally, the Committee recognises that research is only effective if it is communicated in a useful way to those who need to use it. 

COMMUNICATION OF RESEARCH INFORMATION

Rural research and development corporations such as the Fisheries Research and Development Corporation and the Rural Industries Research and Development Corporation, as well as some other research bodies (for example CSIRO) are developing communication strategies or plans. As yet only a few have been put in place and their effectiveness has not been tested.

Approaches to communication that are likely to be effective vary with circumstances. Research undertaken by a small group that literally lives in, and is part of, the community can rely on good communication networks between researchers and the community. This approach may be relevant for small and emerging industries such
as those based on native species. However, effective communication cannot be taken for granted and will need more formal management for larger research institutions.\(^{175}\)

Some characteristics of effective communication have been identified. These include:

a) full identification of, and linking with, all stakeholders;\(^{176}\)
b) mutual learning – that is creating a dialogue with stakeholders;\(^{177}\)
c) appropriate training in communication;\(^{178}\) and
d) evaluation as the basis for improvement of future communication.\(^{179}\)

At present major barriers to effective communication of scientific knowledge are seen to be:

a) a failure to take account of the social and institutional contexts in which communication occurs;
b) lack of experience and training in communication within the research community and other stakeholders;
c) lack of reward for (or even active discouragement of) scientific communication except through learned journals;
d) time restrictions on researchers; and
e) in some cases, commercial or intellectual property rights agreements.\(^{180}\)

**FUNDING**

Having reviewed the various research activities and needs of those sectors utilising native flora and fauna, the Committee concludes that some issues can only be dealt with via a greater injection of resources into research and communication of this research to potential users. This in itself raises two further issues – how these resources are to be obtained and how they should be allocated.

Ideally strategic planning of research and development programs undertaken should be based on assessment of total community costs and benefits. Where the benefit-cost-ratio is greater than one, the program could proceed with the knowledge that the benefits will outweigh the costs.

With regard to the raising of resources, research and development may be funded by the beneficiaries – obtained, for example, by levies on new industries once they become successful or through industry-research organisation collaboration. Where there are gains for biodiversity, environment and equity, it would be appropriate that the whole community pays.

For example, the Horticultural Research and Development Corporation matches industry funding for specific research projects. This is, however, difficult for smaller or developing industries. For instance, in the wildflower industry there is little overlap between growers and exporters and the much larger ‘traditional’ flower sector and the industry has no voluntary or compulsory levy in place to support research. Raising
sufficient revenue through levies is therefore difficult, particularly as traditional flower
growers, many of whom receive exotic-plant material from countries such as the
Netherlands, may be reluctant to subsidise research into native plants. Since
introducing the requirement for a 25 per cent contribution, there has been a significant
fall in the number of research proposals from industry.\textsuperscript{181}

At the recent 5th Australian Wildflower Conference, the manager of the HRDC’s
Wildflowers and Native Plants Programs warned the industry that:

\begin{quote}
There is a danger that this decline could be interpreted as a signal that the
industry believes that RIRDC’s investment to date has been ineffective or
that the industry believes that R&D is irrelevant to its future.\textsuperscript{182}
\end{quote}

The Committee was informed that State government funding for native-plant
programs had decreased in recent years, with a push towards greater funding from
industry. The Committee also notes that industry-focussed funding bodies are under
pressure to produce short-term returns, rather than focus on long-term sustainability
and economic viability.

The Centre for International Economics differentiated research funding into supply-
and demand-driven approaches.\textsuperscript{183} From an examination of major advances in
Australian agriculture, the Centre concludes that these have largely resulted from
supply-driven research.\textsuperscript{184} More recently the trend has been to demand-dominated
research, with industry-based research and development councils taking a prominent
role in directing research.\textsuperscript{185} By inference, the Centre concludes that a balance is
required between research aimed at clearly defined industry needs and more open
inquiry that has the potential to encourage new ways of production and large spill-over
effects. These findings appear to have particular relevance to developments of
industries based on native plants and animals, as these are generally new or emerging
industries.

The Role of Public Funding

Despite the strong interest and support for the notion of using new crops to enhance
agricultural practices, there continues to be serious under-investment in the area.\textsuperscript{186}
One of the reasons may be that “it is a high-risk, long-term activity and benefits are
diffused across producer, processor and consumer sectors, often without regard to
who made the initial investments”.\textsuperscript{187} As such, it has been argued that:

New crops research is a prime example of the necessity of public funding to
establish and sustain core national programs to identify and develop profit
potentials in new crops. This in turn could attract private participation and
risk-taking which is necessary for market forces to function as the
development of a new crop advances through the commercialisation
process.\textsuperscript{188}
In Australia and New Zealand, new agricultural sectors have traditionally been developed by industry in response to perceived market demands, with research used to back-up commercial initiatives rather than lead them. This approach is somewhat limited because it is reliant on the presence of an industry base to identify and pursue all new market opportunities. Commercial companies only deal in new opportunities within their expertise and capabilities and new ideas outside this capability are usually ignored. Most importantly however, new ideas of interest to a company are invariably kept confidential to maintain a possible market advantage. This secrecy leads to an unco-ordinated and haphazard approach to market development on a national scale with would-be growers and investors in new crops not knowing what have been or are being evaluated, which ones have been rejected and why, or which ones have never been evaluated.

Market opportunity research is, in effect, a national resource and consequently it could be argued that it should be centrally funded - by public and/or industry-sector sources.

Development of native-species-based utilisation often involves considerable research, the costs of which may be beyond potential new entrants. It has been suggested that “Governments must take this initiative and carry out some of the R&D for industries.”

Issues Connected with Funding

The Committee identified the provision of adequate funding and cooperation for some areas of research as particularly difficult. Commercial interests are unlikely to voluntarily provide support for fundamental or long-term research or research needed to ensure ecological sustainability.

Co-operation and collaboration produce efficiencies and can be essential to providing the full range of information needed. Legal aspects of ownership of, and access to, native biota complicate this issue. A cooperative approach can conflict with the desire of commercial interests for secrecy and ownership of information.

The balance between funding of tightly targeted, or demand-driven research and more open, supply-driven research may have moved too far in the direction of demand-driven research. This may be limiting unduly more-open and longer-term research with a potential to produce large gains for society.

The Centre for International Economics has concluded that:

The chances of worthwhile R&D [research and development] going unfunded are probably high, especially given the potential for increasing returns in emerging industries.


4 Evidence of this is provided by an inspection of research publications such as the Australian Journal of Experimental Agriculture and Animal Husbandry and journals of the various (former) State Departments of Agriculture.


7 Gott, B. (1999), Department of Biology, Monash University, personal communication, 11 February 1999, and also The Southern Bushfood Association, *Written Submissions*, No. U3; and Beal, A. (1999), Australian Native Produce, Murtho, personal communication, 10 March 1999.


11 ibid., pp. 151-152.


14 Lavery, H. J. (ed.) (1985), *The Kangaroo Keepers*, University of Queensland Press, Brisbane, Queensland, p. 162; and also:


15 ibid., p. 185.

16 ibid., pp. 185-186.

17 ibid., pp. 185-6.


22 This point was also made by the Victorian Aquaculture Council, *Written Submissions*, No. U13.


24 For example, work being coordinated by the Rural Industries Research and Development Corporation and the Fisheries Research and Development Corporation.


26 Fisheries Victoria (1997), Strategic Review Marine and Freshwater Resources Institute, DNRE, Melbourne, Victoria, pp. 10-11.


28 Information needs were described to the Committee by Hunt, N., Secretary of the Tourism Accreditation Board of Victoria Inc., personal communication, 8 July 1999; and also
Hundloe, T., Chairperson of the National Ecotourism Accreditation Program and Charters, A., Director of Planning and Destination Development, Tourism Queensland, personal communications, 11 June 1999.


Hunt, N. (1999), Secretary of the Tourism Accreditation Board of Victoria Inc. personal communication, 8 July 1999.


The Committee investigated this program during its inspection of AMRAD Discovery Technologies facilities, Melbourne.


Methane gas and soil conditioners are already produced from urban waste and sewage through the action of saprophytic organisms. However, the efficiency of these processes may be improved by selection of better organisms.


ibid.

ibid.


ibid.

The Knox Institute was created following the restructuring and relocation of the Institute of Plant Sciences at Burnley College.
Millar, D. (1999), Rural Industries Coordinator, Department of Natural Resources & Environment, Minutes of Evidence, 26 April 1999, p. 30. A substantial part of the funding for these projects is provided by the Rural Industries Development Corporation.


Fisheries Victoria (1997), Strategic Review Marine and Freshwater Resources Institute, DNRE, Melbourne, Victoria, p. i.

ibid., p. 12.

Victorian Fisheries and the Victorian Fisheries Research Institute (1996), Draft Victorian Fisheries Research Plan 1995/96-1999/00. The emphasis on marine fisheries is also indicated by Fisheries Victoria’s 16 Assessment Reports, all of which deal with marine or estuarine fisheries.

ibid., p. 1.

Grant, P. (1999), Technical Officer, Marine and Freshwater Resources Institute, Alexandra, personal communication, 3 August 1999.


ibid., p. 23.


Fisher, F., Director, Graduate School of Environmental Science, Monash University, personal communication, 3 August 1999.

Doctor of Philosophy project undertaken by Dr Belinda Cannell; McClure, R., Department of Biological Sciences, Monash University, personal Communication, 3 August 1999.

Cock P. and Pfueller, S., (1999), Graduate School of Environmental Science, Monash University, personal communications, 26 June 1999.

Shaw, R. (1999), Director of the Victorian Node of the CRC Tourism, Footscray Campus, Victoria University of Technology; personal communication, 21 June 1999.

Clayton, M. (1999), Department of Biological Sciences, Monash University, personal communication, 3 August 1999.

Dumsday, R., (1999), School of Business, La Trobe University, personal communication, 3 August 1999.

ibid.

ibid.


An example of an analysis undertaken by the Australian Bureau of statistics of its data is: Australian Bureau of statistics (1996-97), Zoos, Parks and Gardens Industries, ABS, Canberra.

Bolan, R. (1999), Statistical Inquiries Officer, Bureau of Tourism Research, personal communication, 3 August 1999.

ibid.


95 ibid.
98 ibid.
99 ibid.
101 Nicholas, P. D., Virtue, P., Mooney, B. P., Elliott, N. G. and Yearsley, G. K. (1998), Seafood the Good Food, the oil (fat) content and Composition of Australian Commercial Fishes, Shellfish and Crustaceans, Fisheries Research and Development Corporation Project 95/122, CSIRO Marine Research, Australia.
105 ibid.
106 ibid.


The publication, Rural Industries Research and Development Corporation (1997), *New Crops New Products*, Rural Industries Research and Development Corporation, Research Paper No 97/21 was produced as an outcome of such a conference.


Shaw, R. (1999), Director of the Victorian Node of the CRC Tourism, Footscray Campus, Victoria University of Technology; personal communication, 21 June 1999.


Shaw, R. (1999), Director of the Victorian Node of the CRC Tourism, Footscray Campus, Victoria University of Technology; personal communication, 21 June 1999.


Undertaken by Dr Anthony Cheshire, A., Senior Lecturer, Botany Department, University of Adelaide.

Undertaken by Ms Martine Kinlock, a post-graduate student, Botany Department, University of Adelaide.

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Undertaken by Dr Graham Jones, Senior Lecturer, Department of Horticulture, Viticulture and Oenology, Adelaide University.

Scarvelis, J. (1999), Manager, Export Unit Department of Primary Industries and Resources of South Australia (PIRSA), personal communication, 11 March 1999.

Oades, O. (1999), Dean of Agriculture and Natural Resources Sciences, University of Adelaide, personal communication, 11 March 1999.

Collaboration in SA was described by:

Clark, S. (1999), (1999), Aquaculture Program Leader, Fresh Water Aquaculture, South Australian Research and Development Institute, personal communications, and also

Ingerson, T. (1999), Client Manager, Fresh Water Aquaculture, South Australian Research and Development Institute, personal communications, 11 March, 1999.

Although so far a 1997 Agricultural Research Organisation - CSIRO Memorandum of Understanding has produced little.


For example, scoping research undertaken by the Rural Industries Development Corporation.


ibid., p. 168.

For example, Tytherleigh, A., Written Submissions, No. U29.

Greer, A.E. (1997) The Biology and Evolution of Australian Snakes, Chipping Norton, NSW, as quoted in

Michael Kearney, Written Submissions, No. U35.


Information on this contribution was provided by the late Jean Galbraith, author of the Collins filed Guide to the Wildflowers of South-Eastern Australia, 1977, Collins, Sydney, NSW. Miss Galbraith acknowledged the contribution of the members of the Lartrobe Valley Field Naturalists Club in the Preface to this outstanding reference book.

Research undertaken by the Victorian Field Naturalist Clubs in collaboration with Dr Robert Parsons, Botany Department, La Trobe University, demonstrated the usefulness of this approach.

Rigorous attention is always needed to ensure that information is of good quality.

For example, Rural Industries Research and Development Corporation studies such as Feasibility of a Sustainable Bushfoods Industry in Western Queensland, and Prospects for the Australian Bushfood Industry, see also Internet sit: http://www.rirdc.gov.au/pub/compendium/1995/pr-006.html, 17 August 1999.


Gott, B. and Conran, J. (1998), Victorian Koorie Plants, Yangennanock Women's Group, Hamilton, Victoria; and also,


173 ibid., pp. 197, 201, 204.


176 ibid., p. 199.


179 ibid., pp. 202,204-205.

180 ibid., pp. 198-205.


184 ibid., pp. 50.

185 ibid., pp. 49.


187 ibid., p. 9.

188 ibid., p. 9.


190 ibid., p. 67.

191 Venom Supplies Pty Ltd, Written Submissions, No. U16.

CHAPTER 9
STATUTORY CONTROLS

• THE LEGISLATIVE REGIME
• SPECIES-SPECIFIC CONTROLS
• SECTOR-SPECIFIC CONTROLS
• PROTECTION OF ECOLOGICAL AND BIODIVERSITY VALUES
• PROVISION FOR CONSIDERATION OF ECONOMIC WELFARE AND WELL BEING
• PROVISION FOR EQUITY
• IMPORT-EXPORT ISSUES
• INTELLECTUAL PROPERTY RIGHTS
• CASE STUDIES

Being a body of Parliament, the Committee is most interested in the implications of current Victorian legislation and regulations as they affect the utilisation of native flora and fauna and the extent to which they assist in ensuring that any utilisation is ecologically sustainable.

In this chapter the Committee outlines the basic legislative regime that affects the utilisation of native flora and fauna and reviews this as it affects particular species and particular utilisation sectors. The Committee then considers how the current controls contribute to the ESD objectives of economic welfare, equity and protection of ecological and biodiversity values. A number of more detailed legislative issues are also considered, with three case studies included to provide examples of the system in action.

The following material has drawn on a consultant’s report prepared for the Committee by T. L. Bryant and K. R. Akers.¹

THE LEGISLATIVE REGIME

An array of legislation affects the utilisation of native flora and fauna in Victoria. The key relevant Victorian legislation is:

a) Catchment and Land Protection Act 1994;
   b) Conservation, Forests and Lands Act 1987;
   c) Fisheries Act 1995;
   d) Fisheries Regulations 1998;
e) Flora and Fauna Guarantee Act 1988;
f) Flora and Fauna Guarantee Regulations 1990;
g) Forest Act 1958;
h) Land Act 1958;
i) Meat Industry Act 1993;
j) National Parks Act 1975;
k) Planning and Environment Act 1987;
m) Prevention of Cruelty to Animals Act 1986;
n) Wildlife Act 1975;
o) Wildlife Regulations 1992; and

The Victorian legislative regime regarding the utilisation of native flora and fauna appears to use six main approaches:

a) setting out broad policy and philosophical aspects;
b) providing for adoption of statutory management strategies;
c) listing of species, their habitats or areas of land and/or water;
d) prohibition of uses;
e) licensing or authorisation of uses; and
f) complementary use of legislation and subordinate legislation.

Issues
Some forms of utilisation are covered by more than one Act, others by many, and some are scarcely covered at all.

"The need for the legislation to [be] enforced and for the penalties to be a realistic deterrent" was raised as a key issue. This issue was also raised by the Trade Records Analysis of Flora and Fauna in Commerce (Oceania) Inc (TRAFFIC) who considered that the Senate Inquiry into the Commercial Utilisation of Native Wildlife:

Failed to address one of the main problems facing the management of Australia's wildlife trade, the lack of enforcement of State and federal laws and regulations.

Policy and Philosophical Aspects
Parliament's broad policy intent and philosophical approach can be identified through the 'purposes' and 'objectives' sections of an Act. The 'purposes' of an Act are usually more descriptive of the content of the legislation, with 'objectives' generally more focussed on the desired outcomes of the legislation.

The Plant Health and Plant Products Act 1995 is an example of a more prescriptive approach. It provides for:

a) the monitoring, controlling and eradicating of plant pests and diseases;
b) the packaging, labelling and description of plants and plant products;
c) industry funded schemes for pest and disease control measures and to compensate producers for the cost of controlling pests and diseases.\(^5\)

By contrast, the Prevention of Cruelty to Animals Act 1986 is more outcome focussed. It aims to:

prevent cruelty to animals, to encourage the considerate treatment of them and to improve community awareness about the prevention of cruelty to animals.\(^6\)

Most recent legislation contains a ‘purpose’ as well as ‘objectives’. For example the purpose of the Fisheries Act 1995 is to:\(^7\)

a) provide a modern legislative framework for the regulation, management and conservation of Victorian fisheries including aquatic habitats;
b) reform the law relating to Victorian fisheries;
c) repeal the Fisheries Act 1968; and
d) make consequential amendments to other Acts.

Its objectives are to:

a) provide for the management, development and use of Victoria’s fisheries, aquaculture industries and associated aquatic biological resources in an efficient, effective and ecologically sustainable manner;
b) protect and conserve Victoria’s fisheries resources, habitats and ecosystems;
c) maintain aquatic ecological processes and genetic diversity;
d) promote sustainable commercial fishing and viable aquaculture industries;
e) facilitate access to fisheries for commercial, recreational, traditional and non-consumptive uses;
f) promote the welfare of persons involved in commercial fishing;
g) facilitate the rationalisation and restructuring of the commercial fishing industry; and
h) encourage community and other involvement in fisheries management.\(^8\)

Older legislation, such as the Wildlife Act 1975, does not include ‘objectives’ at all but a more expansive ‘purpose’, for example to:

a) establish procedures in order to promote (i) the protection and conservation of wildlife; (ii) the prevention of taxa of wildlife from becoming extinct and (iii) the sustainable use of and access to wildlife; and
b) prohibit and regulate the conduct of persons engaged in activities concerning wildlife.\(^9\)

Some legislation does not include either a ‘purpose’ nor an ‘objectives’. The only sense of the intent of the legislator is given in the ‘long title’ of the legislation - which may merely briefly describe the contents of the legislation. For instance the Forest A ct
1958 is intended:

to consolidate Victorian laws on the management and protection of State Forests.¹⁰

**Issues**

A clear policy objective relevant to utilisation is not always included in legislation that affects utilisation of native species.

**Management Strategies**

Management plans, strategies, and the power to make ministerial directions, are all aimed at putting the philosophies or rationales of the legislation into some broad operational framework.

Management plans may be prepared to encompass the operation of a particular utilisation sector. For instance, under the *Fisheries Act 1995*, the Minister responsible for fisheries has the power to declare management plans regarding fisheries. These plans may cover matters such as wild stock monitoring, performance indicators, economic values, research needs, human uses, and environmental impact.¹¹ Management plans may also be prepared for a particular area and deal with utilisation of flora and fauna within that area, as is provided, for example, under the *National Parks Act 1975*¹² in relation to wilderness parks.

Strategies may also be used. For instance, under the *Flora and Fauna Guarantee Act 1988* (section 17), the ‘Director General’ (now Secretary) of the Department of Natural Resources and Environment must prepare a Flora and Fauna Guarantee Strategy setting out means for ensuring the survival and evolutionary development of all native flora and fauna in the wild.

Ministerial directions are less expansive but none the less binding. As an example, under the *Fisheries Act 1995* (section 61), the Minister may give directions on many aspects of management of fisheries, licensing requirements, and so forth.

**Listing of Species, their Habitats or Areas of Land or Water**

The use of grouping together of various species, their habitats or parts of the environment generally, into lists, schedules, named classified groups, designated areas of land and water environments, and so forth is used in some of the relevant legislation as a tool to achieving conservation or utilisation purposes.

Examples of this can be seen in:

a) the lists of threatened species in Schedule 2 of the *Flora and Fauna Guarantee Act 1988*;

b) the groups of birds, reptiles, amphibians and mammals that can be used legally as listed in the seven Schedules at the back of the *Wildlife Regulations 1992*;
c) the nominating in the Fisheries Act 1995 of certain fish as ‘priority species’ which carry catch limit quotas;

d) the declaration of certain habitats as ‘critical’; and

e) the dividing up of the state forests, parks and waters under the Forests Act 1958, the National Parks Act 1975 and the Fisheries Act 1995 into certain categories of reserves, with each category often varying as to the type of activity that can legally take place within it.

**Prohibition of Uses**

Legislation may prescribe the complete or partial prohibition on certain uses of native flora and fauna. It may involve:

a) strict prohibitions on certain types of behaviour in relation to, or uses of, native flora and fauna - for instance the trap-shooting of birds is prohibited and carries severe penalties; and more commonly,

b) prohibitions on certain uses without written authorisation - such as a licence or permit or an exemption.

**The Licensing or Authorisation of Uses**

Examples include:

a) animal exhibition licence;

b) apiary licence (3 classes);

c) aquaculture licences (2 classes);

d) eucalyptus oil licence;

e) fishery access licence - permits the taking of specified fish for sale (23 classes, of which 4 directly apply to non-marine fish);

f) fish receivers licence – to receive fish for sale (3 classes);

g) forest produce licence – covering grazing, eucalyptus oil, apiaries, plants, etc on land under the Forest Act 1958;

h) game licences - (5 endorsements);

i) grazing licence;

j) listed fish licence;

k) protected flora licence;

l) recreational fishery licence (2 classes);

m) section 138 licence – covering miscellaneous uses on Crown land under the Land Act 1958; and

n) wildlife licences - private (5 classes), commercial (11 classes), and an assistants licence.

Within some of these licences there are a number of classes, each generally with different entitlements and subject to differing conditions relating to the type of usage and the species of native fauna. Most notably there are many different categories of wildlife licence and fishery access licence.
In addition the relevant legislation includes a number of provisions permitting use by way of permit or written authorisation. The making of a Governor in Council Order to permit the taking or trading of certain species is also provided for.\textsuperscript{20}

**Complementary Use of Legislation and Subordinate Legislation**

With some exceptions,\textsuperscript{29} there is general use of a main or principal empowering Act to set the broad framework of policy, management, conservation, utilisation, licensing, and so forth, with the subsequent introduction of subordinate legislation providing for the detailed implementation of those subject areas.

Examples can be seen in:

a) the *Wildlife Act 1975* which is a principle empowering Act and inter alia states that all wildlife licences must be in a prescribed category, that these licences may be subject to prescribed conditions\textsuperscript{30} and that regulations\textsuperscript{31} may be made which set out the conditions, requirements, restrictions, limitations, etc., of these licences; and

b) relevant subordinate legislation such as the *Wildlife Regulations 1992*, which sets out in great detail the different categories or types of wildlife licences, their eligibility criteria, application procedures, fees, as well as the different species of wildlife that can be taken, housed, bred, and so forth under each particular licence.

The empowering *Fisheries Act 1995* and its relevant subordinate legislation, the *Fisheries Regulations 1998*, have a similar framework.\textsuperscript{32} For example, section 38(1) of the *Fisheries Act 1995* empowers persons to make regulations which set out the various categories of ‘access’ licences for commercial fishing, whilst the *Fisheries Regulations 1998* lists the different classes of access licence for commercial fishing (regulations 201 to 203), the entitlements of holders of those various licences (regulations 204 to 231), any conditions that are attached to the licences (regulations 204 to 337) and administrative matters in relation to them (regulations 232 to 237).

**Administrative Quasi-legislation**

The main administrative ‘quasi-legislation’ referred to in the key relevant legislation are codes of practice. Codes of practise under the *Conservation, Forests and Lands Act 1987*\textsuperscript{33} are subject to a rigorous approval process but compliance is not required unless incorporated or adopted by another law, regulation or condition of an licence or other authority and is ratified by Parliament. Codes of practise under the *Prevention of Cruelty to Animals Act 1986* are subject to a less rigorous process, but are also not obligatory unless so made by another authority. They may specify “procedures for the keeping, treatment, handling, transportation, sale, killing, hunting, shooting, catching, trapping, netting, marking, care, use, husbandry or management of any animal or class of animal ... ”.\textsuperscript{34}
Management plans, action statements and the like are also forms of administrative quasi-legislation and are also generally non-binding. Management plans under the Fisheries Act 1995 are a notable exception - “a public authority must have regard to any relevant management plan” (section 34).

An advantage of such plans is that they generally provide for consultation and involvement of interested persons and can be amended to reflect changing needs and requirements.

**Issues**
Codes of practice and management plans affecting utilisation generally have no immediate statutory effect. As such their ability to achieve the legislative objective may be reduced.

**Approaches Used By the Legislation**
From a utilisation perspective, two main approaches are used in the Victorian legislation:
- a) by particular species; and
- b) by particular sector or industry.

**SPECIES-SPECIFIC CONTROLS**
Victorian legislation treats plants and animals differently. Controls relating to plants do not generally differentiate between taxa or taxa grouping, but are grouped by broad category according to rarity and perceived management need. They generally also vary according to the tenure of the land on which they are found or grown. In contrast, legislation dealing with fauna differentiates between taxonomic groupings including between individual species. Controls relating to fauna also deal with broad categories based on rarity and perceived management need but rarely vary according to tenure.

The use of native plants is dealt with predominantly by one piece of legislation - the Flora and Fauna Guarantee Act 1988. Other legislation deals with native plants on areas of defined tenure, most relevantly the Forests Act 1958.


The nature of the controls under these Acts also varies according to whether it is dealing with a plant or an animal. The emphasis of the controls dealing with flora, other than the 'listed' species, is on the protection of wild populations. There are no special controls applying to the use of propagated native flora (nor dealing with the issue of genetic drift).
In contrast the relevant legislation affecting the use of fauna, with the exception of fish, is focussed primarily on the use and welfare of captive-bred animals. Protection of wild animals is also dealt with. Controls affecting fish are similar to those dealing with flora; that is they are focussed on wild harvest.

**Controls affecting both Flora and Fauna**

With respect to species that are considered to be threatened with extinction, both flora and fauna are subject to the one Act - the Flora and Fauna Guarantee Act 1988. In addition, vertebrate fauna (mammals, birds, amphibians and reptiles) may be classified as ‘endangered’ wildlife under the Wildlife Act 1975.

**‘Listed’ Species**

‘Listed’ species are those species considered to be threatened with extinction and have been included on a schedule (Schedule 2) of the Flora and Fauna Guarantee Act 1988. The nomination and assessment process is prescribed by legislation and regulation.

The controls that apply to ‘listed’ species may potentially be quite restrictive and apply irrespective of tenure or whether the ‘listed’ species are part of a wild, or captive or cultivated population. Listing does not necessarily mean, however, that any particular form of utilisation is prohibited. The restrictions on use are subject to the recommendations of defined management processes (for example, the preparation of an action statement or interim conservation order) laid down under the Act. Any particular use may require a permit under the provisions of the interim protection order irrespective of but subject to prescribed assessment criteria (as provided for under section 10).

If a plant, ‘listing’ brings the more general provisions applying to ‘protected’ flora into play. If an animal, no special provisions apply if ‘listed’, unless the animal is a fish. If a ‘listed’ fish, use is only permitted if in accordance with a Governor in Council Order or a licence issued by the ‘Director-General’ (now Secretary).36

Thus with the exception of ‘listed’ fish, the level of protection for individual specimens of the ‘listed’ species is no more than that available to any unlisted species.

Where a ‘listed’ species is already encompassed by other legislative or regulatory provisions, restrictions on use are made by administrative decision. The Committee understands that in practise where a discretionary use is provided for, the decision maker (generally the Minister or the Secretary to the Department of Natural Resources and the Environment) will generally not permit use of a ‘listed’ species other than for research allied to the conservation of the species. Where use of species is permitted by way of schedule as declared by the Governor in Council (for instance many vertebrate animals, as is discussed below), ‘listed’ species are not included by administrative choice.
The preparation of an ‘action statement’ is required to be prepared for any listed taxon, community or ‘potentially threatening process’ ‘as soon as possible’ after listing. The action statement “must set out what has been done to conserve and manage ... [the ‘listed’ species] and what is intended to be done and may include information on what needs to be done”. Any utilisation, by administrative practise, would need to be consistent with such action statement. Currently, there is a backlog in the production of such action statements.

Controls Affecting Flora

In effect, all native plants are grouped into one of seven categories:

a) ‘listed’ species - that is plants threatened with extinction, see previous discussion above;

b) ‘protected’ plants - as declared (and includes all ‘listed’ flora);

c) other plants - all flora not included in the above two categories;

d) ‘prescribed’ flora - plants that must not be released into the wild;

e) ‘forest produce’ (which can include plants of any of the above categories);

f) ‘reserved trees’ (which can include any tree, shrub, or bush); and

g) ‘noxious weed’ - as declared (excludes all ‘listed’ species).

‘Protected’ Plants

In general the controls restricting the use of ‘protected’ flora apply only to flora on Crown land or flora on private land that is traded (that is, flora offered for sale). Such ‘protected’ flora may only be taken, traded, kept, moved or processed subject to licence (none granted to date), permit or authorisation under Order of the Governor in Council.

In addition any ‘protected’ flora that is “propagated from flora which has been lawfully obtained and kept” is exempt from these requirements.

Utilisation that involves trade is thus provided for, harvesting (take) or processing of ‘protected’ flora is provided for on Crown lands under permit and on freehold lands ‘as of right’.

In practise there is little regulation as a Governor in Council Order under the Flora and Fauna Guarantee Act 1988 has authorised the “keeping, moving and processing of ‘protected’ flora,” - thus negating the need for a licence or permit. Such authorisation may, however, be subject to conditions. For instance, tree ferns need to be tagged.

Currently declared ‘protected’ flora includes about 25 percent of Victoria’s native flora. Plants appear to be declared on the basis of perceived management need - the listed plants include attractive wildflowers that in the past were sought for recreational picking, orchids and ferns (sought for garden planting), and species targeted for commercial harvesting - sphagnum moss, grass trees and species of daisy. A number
of species that are used for commercial harvesting are not, however, included as ‘protected’ flora. Such species including eucalypts, seagrass and kelp.

No criteria are specified for declaration. The only exception is that ‘listed’ species (that is, all flora threatened with extinction) automatically come under the provisions of ‘protected’ flora.46

‘Other’ Plants
Effectively no controls apply to native plants not ‘listed’ or declared to be ‘protected’. Nor do any controls apply to ‘protected’ plants that occur in the wild on freehold land that are not traded. Any utilisation is thus not specifically precluded, but neither is it provided for.

‘Prescribed’ Flora
The Flora and Fauna Guarantee Act 1988 includes a category of ‘prescribed’ flora, being plants that must not be abandoned or released into the wild.47 However, no such plants have been prescribed to date.

The provisions of the Catchment and Land Protection Act 1994 that deal with ‘noxious weeds’ may provide an alternative mechanism to control the release of plants into the wild (see section on ‘noxious weeds’ below).

‘Forest Produce’
‘Forest produce’ is a tenure-based category of flora. It applies to all flora which comes under the provisions of the Forests Act 1958 - which, in effect, means most Crown land other than national parks and conservation reserves.

The Forests Act 1958 primarily deals with the use of native plants for the production of timber. However, the definition of ‘forest produce’ includes plants, leaves, flowers, ferns, grass-trees, roots, honey, beeswax, eucalyptus oil and so forth.48

Section 3 of the Forests Act 1958 restricts the removal of any forest product other than in accordance with the provisions of the Act. The ‘Director-General’ (now Secretary) may permit the taking or converting of forest produce,49 and grant a lease (up to 21 years) of an area for, amongst other things, grazing (Section 51) or a licence or permit to graze cattle, to take away forest produce or for “any other purpose whatever relating to or connected with ... forest produce” (Section 52).


‘Reserved Trees’
Trees, which are defined as including shrubs and bushes,50 may not be removed without a permit (section 59(1)). There is also a provision (section 60) that provides
for the Governor in Council to declare a particular tree or class of trees as ‘reserved’ and consequently protected from removal or destruction.

As at June 1999 no tree or class of tree were declared under this provision.

The provision effectively duplicates the ‘protected’ flora provisions of the Flora and Fauna Guarantee Act 1988, although it is more restrictive in that it does not provide for any use, even under permit.

‘Noxious Weed’
Native flora may be declared as a ‘noxious weed’ under the Catchment and Land Protection Act 1994 (more strictly, may be declared as one of the four defined categories of weed). The criteria for declaration as a ‘noxious weed’ is that they are: “considered to have, or have the potential to become, a serious threat to primary production, Crown land, the environment or community health in Victoria”.

Native species that are a ‘listed’ species or a species which is part of a ‘listed’ community (under the Flora and Fauna Guarantee Act 1988) cannot be declared ‘noxious weeds’.

‘Noxious weeds’ or their seeds may not be deposited on any land without permit, and must be controlled on request.

Controls Affecting Fauna
In summary, the relevant legislation groups animals into the following categories:

a) ‘listed’ species - any animal that has been threatened with extinction (see previous discussion above);
b) ‘wildlife’ - all vertebrates other than humans and fish, and any ‘listed’ invertebrate (as well as deer, and other introduced animals so declared);
c) ‘protected wildlife’ - all ‘wildlife’ except for animals declared as ‘pests’, ‘unprotected’ or ‘unprotected in an area’;
d) ‘endangered wildlife’ - as declared, a subset of ‘protected’ wildlife;
e) ‘notable wildlife’ - as declared, a subset of ‘protected’ wildlife;
f) ‘game’ - as declared, may include any species of ‘wildlife’ but hunting may only take place during a proclaimed ‘open season’;
g) ‘other protected wildlife’ - protected wildlife not declared as ‘endangered’, ‘notable’ or ‘game’;
h) ‘whales’ - a subset of ‘wildlife’, includes dolphins;
i) ‘unprotected’ wildlife - as declared, may be any species of ‘wildlife’;
j) ‘fish’ - all aquatic fish and molluscs, crustaceans (mostly aquatic), echinoderms (all marine) and any declared aquatic invertebrate;
k) ‘fishing bait’ - as declared, may be any species of fauna that is not ‘protected wildlife’ (effectively any fish or invertebrate);
l) ‘declared aquatic invertebrate’ - as declared;
m) ‘priority species’ - abalone, rock lobster and any other ‘fish’ listed by regulation;
n) ‘protected aquatic biota’ - as declared, may be any aquatic flora or fauna except ‘protected’ wildlife, ‘protected’ flora, and ‘listed’ species of fish or invertebrate;
p) ‘pest’ animal - any animal other than ‘fish’, ‘listed’ fauna, ‘endangered’ wildlife, ‘notable’ wildlife and non-feral domestic species (of the four categories of ‘pest’ animal, native species can only be declared as an ‘established pest animal’);

Any one species of animal may be included in a number of these various categories. In addition, the Wildlife Regulations 1992 further categorise ‘wildlife’ into seven, overlapping schedules, without cross reference to any of the above categories.

**Vertebrates, Other Than Humans and Fish**

Native vertebrate species, other than humans and fish, (that is ‘wildlife’) are subject to more legislation than any other grouping of native species.

All ‘wildlife’ comes under the provisions of the Wildlife Act 1995 (‘wildlife’ also encompass any ‘listed’ invertebrate as well as deer, and other introduced animals so declared). The designation as ‘wildlife’ has little effect unless the ‘wildlife’ is also declared ‘protected’ or ‘game’. However, ‘protected wildlife’ is defined to include all ‘wildlife’, other than declared ‘pest animals’, and those specifically declared to be ‘unprotected’ or ‘unprotected in an area’.

‘Protected wildlife’ are subject to provisions that provide both protection and utilisation subject to licence or permit (‘whales’ are, however, excluded from the provisions permitting utilisation under licence). It also brings in to play a number of penalty provisions for utilisation not undertaken in accordance with a licence or permit.

‘Protected wildlife’ may be declared to be ‘endangered wildlife’ or ‘notable wildlife’. Such declaration has little effect other than making the penalties for hunting, taking, possessing, breeding and processing without a licence or other authorisation higher than for ‘other protected wildlife’. It does not preclude the granting of such licence or other authorisation (and any person or class of person can be exempted by the provisions, by regulation). There are no defined criteria for declaration. Moreover, there is no cross-reference to ‘listed’ species under the Flora and Fauna Guarantee Act 1988. Many ‘listed’ species are not included as either ‘endangered wildlife’ or ‘notable wildlife’ and some ‘endangered wildlife’ and ‘notable wildlife’ are not ‘listed’ species (meaning that the penalties for taking non ‘listed’ species may be greater than those that are ‘listed’ ie threatened with extinction). Designation as ‘other protected wildlife’ is merely a devise to apply lower levels of penalties than is applied to ‘endangered wildlife’ or ‘notable wildlife’.
'Game' species may include both exotic and native species. Currently of the 20 plus species declared to be game, ten are native species - Lathams snipe (currently not subject to an open season), one quail (the stubble quail, *Corturnix pectoralis*) and eight species of duck. In terms of native species, the major implication of being declared as 'game' is that it can be hunted under licence during a declared season. There are no prescribed criteria for designation as 'game' (nor any restrictions - any 'listed' species of vertebrate could, for instance, be declared as 'game').

'Whales' (meaning “any member of the sub-order Mysteceti or the sub-order Odontoceti of the order Cetaceae”, that is all dolphins and whales found in Victoria) are subject to a series of special provisions of the *Wildlife Act 1975* which, in effect, preclude most forms of utilisation. Not only is the taking of 'whales' precluded there are also restrictions and substantial penalties for interfering with 'whales'. Utilisation of 'whales, under permit, may be permitted by the Secretary only for a limited number of purposes, such as for scientific, educational or tourist activity.\(^55\)

Declaration of a species as 'unprotected' can occur under two provisions of the *Wildlife Act 1975*. If declared by the Governor in Council under section 3 of the Act all provisions related to 'protected' species no longer apply. No criteria for such declaration are defined. Currently there are no species so declared. If declared under section 7A of the Act, such declaration can only be applied if:

- it appears to the Minister that a taxon or kind of protected wildlife is causing injury or damage to (a) any building, vineyard, orchard, garden or other property; (b) any crop, grass, trees or other vegetation; or (c) any taxon or kind of animal (including fish) ... \(^56\)

Such declaration is thus, in effect, a tool to permit control, but not otherwise reduce the ability to provide for utilisation or level of protection. Each declaration is required to specify the area to which it applies, conditions and restrictions on the persons authorised and methods that may be used to kill take or otherwise control the declared species.

Species currently declared to be 'unprotected' include:

- a) common wombat (*Vombatus ursinus*) - can only be taken or destroyed by land-holders in eastern Victoria (as defined);\(^57\)
- b) long-billed corella, sulphur-crested cockatoo and galah - can only be taken or destroyed by land-holders where there is serious damage (as defined);\(^58\) and
- c) common brushtail possum (*Trichosurus vulpecula*) - can only be trapped and, under certain conditions, destroyed by home-owners or licensed 'wildlife controllers' if living in a building\(^59\) and if that mammal is causing damage or creating a nuisance to a residential or commercial building.\(^60\)

'Pest' animals may include any vertebrate animal other than ‘fish’, ‘listed’ fauna, ‘endangered’ wildlife, ‘notable’ wildlife and non-feral domestic species. If so declared (as an ‘established pest animal’) any form of utilisation is restricted unless as part of
the bona fide operations of the Zoological Board of Victoria or associated zoo, or for research purposes or in accordance with a permit or regulation. It is understood that such permits would only be granted in special circumstances.

**Fish**

All ‘fish’ comes under the provisions of the *Fisheries Act 1995* (‘fish’ is defined to include a number of animal groups which are not fish – it encompasses all aquatic molluscs, all crustaceans (mostly aquatic), echinoderms (all marine) and any ‘declared aquatic invertebrate’.

Inclusion under the *Fisheries Act 1995* brings into play a number of provisions that provides for and regulates the utilisation of fish, particularly taking of ‘fish’. All take for sale, all use of habitat for hatching, rearing, breeding of displaying fish for commercial purposes, use of specified fishing equipment, and take of fish from inland waters (marine waters) is reliant on the possession of some form of licence. Only two of the fishery licences, relevant to non-marine fisheries, are endorsed for the taking of particular species. Both are eel fishery access licences. The holders of unrestricted licences are none the less restricted to taking species in accordance with regulations (which may prescribe areas, seasons, methods of take, and size and catch size).

The major effect of ‘priority species’ designation is that it doubles the prescribed penalties for offences. No non-marine species have been so designated to date.

Any species of fish may be declared as ‘protected aquatic biota’ unless it has previously been ‘listed’ under the *Flora and Fauna Guarantee Act 1988*. Such declaration may apply to some or all of the State. The implication for utilisation of such declaration is that:

> a person must not take, injure, damage, destroy, possess, keep, display for reward, release into Victorian waters or sell … without a permit or unless authorised …”

Under section 73, however, the Governor in Council may authorise use of any protected biota (unless ‘listed’), subject to conditions. Under section 72, the Secretary may also issue a permit, but subject to meeting prescribed criteria (including having no previous convictions). Issue of permit is not permitted if:

> the issue of the permit would be inconsistent with any relevant management plan, or if there is no relevant management plan, would be harmful to the welfare of any relevant fishery or aquatic ecosystem.

The implication of a fish being declared under the *Fisheries Act 1995* (section 75) as a ‘noxious aquatic species’ is that it can not be brought into Victoria, taken, hatched, kept, sold, transported, or released with out a permit from the Secretary (section 81) or Governor in Council authorisation (section 83). Otherwise the relevant provisions are identical to those for ‘protected aquatic biota.’
Aquatic Invertebrates
If the aquatic invertebrate is a mollusc, crustacean, echinoderm (all marine) or a ‘declared aquatic invertebrate’ all the provisions affecting utilisation as prescribed under the *Fisheries Act 1995* (as outlined above), apply. ‘Declared aquatic invertebrates’ are those declared under section 6 (2) by the Governor in Council. Nor criteria are defined. Currently no non-marine invertebrates have been so declared.

An invertebrate may also be declared under section 6 of the *Fisheries Act 1995* to be ‘fishing bait’, and thus come under some form of regulation.

If not covered by the provisions of the *Fisheries Act 1995*, provisions affecting potential utilisation only come into play if the invertebrate is a 'listed' species when limited controls come into play as previously outlined.

Non aquatic Invertebrates
There are no legislative provisions affecting non aquatic invertebrates, other than the if the species is a 'listed' species when limited controls come into play as previously outlined or if declared under section 6 of the *Fisheries Act 1995* to be 'fishing bait'.

Controls Affecting Micro-organisms
Effectively no controls apply to micro-organisms, unless they are 'listed' as a threatened species under the *Flora and Fauna Guarantee Act 1988*. If a plant, a micro-organism is declared to be ‘protected’ under the *Flora and Fauna Guarantee Act 1988*, or if an aquatic species is declared a ‘protected aquatic species’, such declaration bringing into play provisions that provide for utilisation and protection. No species have however, been declared under these provisions. No provisions apply to non-flora micro-organisms that are terrestrial (such as soil fauna).

Issues
There is an array of species-specific controls. Some overlap with each other, some provisions are seldom used, declaration into various categories may or may not be based on statutory criteria, and there is considerable variation in the complexity and the controls vary according to whether the species affected is a plant, vertebrate or invertebrate with the logic behind such variation not always obvious. Some species are subject to effectively no formal mechanisms of utilisation management or control.

The Maroondah City Council has found that the lack of substantial penalties for non-compliance with the provisions of the *Flora and Fauna Guarantee Act 1988* has been exploited by some commercial plant operations - with the result that the populations of some species of rare local flora have been decimated. They recommend that:

All harvesting and utilisation of native flora and fauna is strictly controlled by a system of accreditation and licensing. Substantial penalties should also apply for non-compliance of these conditions.
SECTOR-SPECIFIC CONTROLS

This section briefly outlines the controls that apply to the various utilisation sectors outlined in Chapters 3 to 6. It excludes consideration of the requirements of threatened species ‘listed’ under the Flora and Fauna Guarantee Act 1988. These affect and apply to all utilisation sectors.

The sectors have been grouped into three parts:
   a) those for which there are no specific controls;
   b) those for which general requirements apply; and
   c) those for which specific requirements apply.

Sectors for Which There are No Specific Requirements

Agricultural Use - Native Fodder Crops.
There are no particular provisions that apply to the use of native fodder crops, assuming that the plants are obtained from a lawful source.

Amateur Collectors and Enthusiasts - Plant Collectors and Propagators
No sector-specific controls exist, but a licence or permit is required under the Flora and Fauna Guarantee Act 1988 (Section 48) to take, trade in, keep, move or process plants if declared ‘protected’ under the Flora and Fauna Guarantee Act 1988 - unless the plants are obtained from a lawful source. If obtained from a lawful source, they may be propagated without need for any licence or permit.

Bushfoods
There are no particular provisions that apply to the production of native plants used for bushfoods, assuming that the plants are obtained from a lawful source.

The sale and processing of bushfoods is, however, subject to the normal requirements that need to met for any food, such as those under the Food Act 1984.

Ecotourism and Recreation - excluding Wildlife Parks and Botanic Gardens and Recreational Fishing and Hunting
There are no particular provisions that apply to non-consumptive forms of ecotourism or recreational use of flora and fauna, other than access rights in the case of commercial or large-group activity. Such access rights are, in the instance of Crown lands, granted by Parks Victoria under the National Parks Act 1975 or other relevant legislation.

Persons, with the relevant permit, are permitted to interfere with ‘whales’ for the purpose of conducting tourist activities to the extent of approaching no closer than a prescribed distance.
Industrial Chemicals and Pharmaceuticals
There are no particular provisions that apply to the production of industrial chemicals and pharmaceuticals obtained from native flora and fauna, assuming that the native biota used are obtained from a lawful source.

The actual industrial processes are, however, subject to the normal requirements that need to be met for the production or release of any industrial chemical or pharmaceutical (mostly under Commonwealth legislation).

Land Rehabilitation and Amenity
There are no particular provisions that apply to the use of native flora for land rehabilitation or amenity plantings, assuming that the plants are obtained from a lawful source.

Seed banks, whether commercial or not, are not required to be registered or subject to any particular regulatory control.

Pets and Companion Animals
As was outlined in Chapter 6, the majority of native animals kept as pets do not require any licence, irrespective of the number of types or individuals kept. Indeed such absence of control is less restrictive than for dogs and cats, which must be registered and subject to limitations on the number kept under the Domestic (Feral and Nuisance) Animals Act 1994.

The keeping of some less common animals require the holder to obtain a wildlife licence. This is covered in the discussion of controls affecting ‘amateur collectors and enthusiasts’ below.

Sectors For Which There Are General Requirements

Amateur Collectors and Enthusiasts - Animals
Aviculturalists (bird keepers), herpetologists (reptile enthusiasts) and those who keep and breed amphibians and mammals all need to be holders of a wildlife licence under the Wildlife Act 1975 (other than if only very common ‘pet’ species are kept).

Five classes of licence are available:
   a) Private Wildlife (Category One) Licence;
   b) Private Wildlife (Category Two) Licence;
   c) Private Wildlife (Category Three) Licence;
   d) Private Wildlife (Special Category) Licence; and
   e) Private Wildlife (Specimen) Licence.

The first three licences permit the holder to keep, breed and trade an increasingly larger number of species (as per defined schedules) as the category level increases. There is no restriction on the species that may be listed (including those ‘listed’ as
threatened under the Flora and Fauna Guarantee Act 1988 and venomous species), but in practice they are mostly common widespread species or have very large captive-populations.\textsuperscript{75}

The species permitted by the higher categories are understood by the Committee to be those that are less common in the wild and/or are more difficult to keep and breed. The current scheduled species do not, for example, include any ‘listed’ species, nor raptors (such as eagles or owls). There is not, however, any requirement of the holder of the licence of more difficult-to-handle species to demonstrate proof of competency. The list of species that can be kept is also under continual pressure, as Victorians seek to obtain specimens of captive bred species from other more liberal States (notably South Australia). Moreover, once a species is included on a schedule, it is very difficult to have it de-listed, even if the species proves unsuited to captivity - as the captive population would have to be dealt with.

There are no restrictions on the number of individual specimens that may be kept by the holder of a licence (other than for emus, which are limited to ten), though under existing administrative policy they must all be held at one premises.

The holder of a private wildlife (special category) licence permits the holder to keep or trade any wildlife not otherwise permitted under schedule - as specified on the licence and subject to all trade requiring the written approval of the Secretary.

All licence holders are required to keep animals only at the specified location, maintain records (of the animals kept, bred, traded and deceased) and send in regular returns. Individual animals may be required to be marked.\textsuperscript{76} Any trading must occur at the specified premises of the licence holder and not occur within 6 months of obtaining the specimen - the latter being the main difference between the trading rights of the holder of a private wildlife licence and a commercial wildlife licence (who may trade as soon as an animal is obtained).

A private wildlife (specimen) licence is required to be held by any one who wishes to keep or trade any prepared or mounted specimen of dead wildlife.\textsuperscript{77}

**Building Material and Fibre**

There are no particular provisions that apply, assuming that the plants are obtained from a lawful source.

There are no controls on the harvesting of broombush for brush fencing from freehold lands. Material obtained from Crown lands, however, requires a licence under the Land Act 1958 (under section 138) and payment of a royalty. These annual rights of access are to the common resource shared by all licensees rather than to a prescribed area. The licences may be subject to a quota allocation as determined by an
assessment of the sustainable yield of the resource, as well as any conditions that may be specified, such as the method of harvesting.

Harvesting of seagrass is ordinarily undertaken from Crown lands under the authority of the Land Act 1958 (under a section 138 licence) and payment of a royalty and may be subject to conditions.

**Essential Oils**
Most essential oils produced in Victoria, with the exception of eucalypt oils, are obtained from cultivated plants to which no particular provisions apply if the plants are obtained from a lawful source. Access to plants for harvesting of eucalypt leaves to produce eucalyptus oil requires no authorisation if undertaken on freehold lands.

Where the eucalypt leaves are harvested from wild plants on Crown land, a ‘eucalypt oil licence’ under the Land Act 1958 is required (Section 150). It is understood that most wild harvest occurs under the auspices of such licences. The licence may cover both the manufacture and production of eucalyptus oil. Such licences may be subject to conditions. To date, distilleries to manufacture oil are generally allied to the harvesting area and thus often located on Crown land.

If harvesting, or distilling, is undertaken on land subject to the Forests Act 1958, notably State forest, an authority, such as a section 52 licence, is required. Conditions may be prescribed.

**Floriculture**
No particular provisions apply, assuming that the plants being propagated are obtained from a lawful source. Even if a ‘protected’ plant no controls apply as a Governor in Council Order under the Flora and Fauna Guarantee Act 1988 has authorised the “keeping, moving and processing of ‘protected’ flora.”

There are no restrictions on wild harvest either, unless the species has been declared to be ‘protected flora’ or the harvesting is to occur on Crown land that comes under the jurisdiction of the Forests Act 1958. In the former case, a permit or licence is required under the Flora and Fauna Guarantee Act 1988 (section 48).

If harvest is licensed under the Flora and Fauna Guarantee Act 1988 it must not threaten the conservation of the taxon or community of which it is a part, and individual specimens may also be required to be tagged. If the harvesting is done under the jurisdiction of the Forests Act 1958, an authority such as a section 52 licence is required; conditions may be prescribed. Currently most wild harvest, including that of ‘protected’ species other than of tree ferns, is undertaken under authority of a Forests Act licence.
Kelp
Harvesting of kelp is ordinarily undertaken on Crown land under the authority of the Land Act 1958 (under a section 138 licence) and payment of a royalty. It too may be subject to conditions.

Nursery Industry
It is legal to propagate and trade in native flora. No particular provisions apply if the plants being propagated are obtained from a lawful source. There are no restrictions on wild harvest from either freehold or Crown land either, unless the species has been declared to be ‘protected flora’, or if the harvesting is undertaken on Crown land that comes under the jurisdiction of the Forests Act 1958.

A permit or licence is required for commercial use under the Flora and Fauna Guarantee Act 1988 (section 48) if the plant is ‘protected’ flora or if the area subject to harvesting is part of a critical habitat determined under that Act.

Both the Flora and Fauna Guarantee Act 1998 and the Forests Act 1958 are administered by the Department of Natural Resources and Environment, who is thus responsible for regulating the wild harvest of native flora. In Victoria, under current administrative practise, only limited wild harvest is permitted. The wild harvest of five native plant species for the ornamental horticulture trade is currently permitted. The species harvested are:

a) tree ferns (Dicksonia antarctica and Cyathea australis);
b) billy buttons (Pycnosorus globosus);
c) grass trees (Xanthorrhoea australis); and
d) sphagnum moss.  

Licences under the Flora and Fauna Guarantee Act 1988, which is also used to regulate the harvest of native flora from State forests, covers the harvest of native species from private land where the flora is to be used for commercial purposes. Authorisation may be by Governor in Council Order, permit or licence, although licenses have not been used to date. Such licence or authorisation, may only be permitted as long as the conservation of the particular flora is not threatened or it does not cause injury to property, crops, stock or listed taxa or communities of flora and fauna.

If harvesting occurs under the jurisdiction of the Forests Act 1958, an authority is also required, such as section 52 licence - the general ‘minor forest produce’ licence. There are no pre-requisite criteria defined for the granting of such licences, but Conditions may be prescribed. In practise, permits are generally only granted under the Forests Act 1958.

Various provisions of the Plant Health and Plant Products Act 1995 may also affect the propagation of native flora, for example:

a) section 8, which prohibits the sale of diseased seed.
b) section 31, which sets down labelling requirements for the sale of seeds;

c) section 32, which makes it an offence to sell seeds declared to be prohibited;

and

d) section 39, which requires all plants or plant products sold for propagation to be identified clearly.

This Act does not specifically mention the term ‘native flora’ but the definition of ‘plant’ is sufficiently broad to cover it.  

Outdoor Education and Research Activities

There are no particular provisions that apply to non-consumptive forms of outdoor education, other than access rights in the case of commercial or large group activity. Such access rights are, in the instance of Crown lands, granted by Parks Victoria under the National Parks Act 1975 or other relevant legislation.

In contrast most forms of research activity require some form of authorisation, under, for example, the Wildlife Act 1975 or the National Parks Act 1975. The Wildlife Act 1975 provides for the Secretary to give written authorisation to a person to take samples from, or experiment on, wildlife for the purposes of management, conservation, protection, control, education about, or research into, wildlife or for scientific or other study of wildlife.

Moreover the Secretary must carry out research for the purpose of conserving or propagating wildlife, or improving, conserving or maintaining wildlife habitat. Among the forms or purposes of such research are “economic studies and investigations with respect to the raising, keeping and rearing of any taxon of wildlife for commercial purposes” and public education programmes. There is, however, no reporting requirement for the specified obligatory tasks.

It is, with the relevant permit, possible for persons to legally interfere with or have in their possession, certain species of whales for scientific or educational purposes.

A general fishery permit will allow the holder to take fish for research, educational and scientific purposes, and there is also provision for the Governor in Council to declare any specified waters to be a fishery reserve for scientific, educational or research purposes.

Wildlife Shelters

The operators of all wildlife shelters require authorisation from the Secretary under Section 28A of the Wildlife Act 1975. Such authorisation is, by way of condition, subject to the recording of the animals kept, notification of all assistants, and submission of returns.

The shelters are subject to a code of practice adopted under the Prevention of Cruelty to Animals Act 1986 - the Code of Practice for the Operation of Wildlife Shelters.
review of this code of practice has recently commenced, in conjunction with the Bureau of Animal Welfare, in order to improve wildlife care and incorporate the latest research findings.90

Sectors For Which There Are Specific Requirements

Agricultural Use - Bush Grazing
The provisions relating to the use of native flora for bush grazing are tenure-based. Areas of Crown land may be used under lease, licence or permit. Such authorisations may be subject to conditions. There are no restrictions on use of native flora for grazing on freehold land, unless the land is subject to an interim conservation order or is part of a declared critical habitat under the Flora and Fauna Guarantee Act 1988.

On unreserved Crown lands provision for access to flora for grazing is made under the Land Act 1958 - under grazing lease (Section 123), licence (Section 130), or agistment permit (Section 133A). Conditions include that 'forest produce' may not be removed.91 These provisions can be used to restrict the number and type of stock carried and require exclusion from regenerating areas.92 There is not, however, a general power of making conditions. There is no cross-reference to the Flora and Fauna Guarantee Act 1988.

In reserved or protected forests, the Forests Act 1958 applies. While primarily the Act is focussed on the use of native plants for the production of timber, it also includes provisions for the use of 'forest produce'. The latter is defined to include, amongst other things, plants and leaves.93 Section 3 of the Forests Act 1958 restricts the removal of any forest product other than in accordance with the provisions of the Act. The 'Director-General' (now Secretary) may permit the taking or converting of forest produce,94 and grant a lease (up to 21 years) of an area for, amongst other things, grazing (Section 51) or a licence or permit to graze cattle (Section 52). There is a general power of imposing conditions in the Act. There is no cross-reference to the Flora and Fauna Guarantee Act 1988.

Aquaculture Including Hatcheries
The Fisheries Act 1995 (Vic) allows people to operate an aquaculture business as long as they have the requisite licence95 or general permit96. There is also provision for the Governor in Council to declare any specified waters to be a fishery reserve for the purpose of aquaculture.97 It is unlawful to interfere with commercial aquaculture equipment and activities.98

The aquaculture licenses are a form of commercial fishery licence. There are two types:
   a) aquaculture (private land) licence; and
   b) aquaculture (Crown land) licence.
In practice most inland water licences are of the former type.
A number of standard conditions are prescribed by the Fisheries Regulations 1998. These include:

- notify the secretary of the outbreak of specified diseases;
- not selling fish or equipment affected by disease or toxic algae; and
- complete crop production returns.99

The aquaculture licences are annual licences, but renewable. They are also ‘transferable’ and thus tradeable commodities. They may be held by a body corporate as well as by an individual person.

**Commercial Fishing**

The Fisheries Act 1995 (Vic) s. 36(1) forbids a person from taking fish for sale or using commercial fishing equipment unless authorised under that Act.100 The main form of authorisation is by way of various types of fishing access licence. Those relevant to inland waters are:

- bait (general) fishery access licence;
- eel fishery access licence type A;
- eel fishery access licence type B; and
- inland fishery access licence.

An array of conditions and regulations need to met by the holders of such licences, including quotas on the total allowable catch (for example, under section 64), season closures, restrictions on species permitted to be taken, traded or processed, bait, or fishing method (section 67 and the Fisheries Regulations 1998), size (section 68A and the Fisheries Regulations 1998). Boats used for commercial fishing purposes must be registered.101

Other restrictions on utilisation that provide for the management of the fishery or the ecosystem may be prescribed by ‘fishery notice’ made under section 152 of the Act. In addition, the Minister (under section 62) “may give a direction on any matter relating to the management of one or more fisheries or one or more zones of a fishery”. Any restrictions applying to ‘protected aquatic biota’ or ‘listed’ threatened species (under the Flora and Fauna Guarantee Act 1988) also apply.

The eel fishery access licence type A is ‘transferable’ and is thus a tradeable commodity. It may also be held by a body corporate (rather than an individual person).

Special provisions apply to ‘developing fisheries’. These are defined by regulation or ministerial direction and provide for fisheries not subject to the defined access licences (renewable licences). They are for a three year period, but may be reissued. In effect it provides for a period without prescriptive regulation. None currently affect inland waters.
It is an offence, without authorisation under the Fisheries Act 1995, to receive any fish for sale. Authorisation is provided through the issue of a ‘fish receivers licence’ (section 41). Under the Fisheries Regulations 1998, however, only three classes of licence have been created, none of which apply to inland water fisheries. It is not clear to the Committee under what authority a retailer thus acquires inland fish.

**Eels**
The eel fishery is subject to the Fisheries Act 1995, and generally undertaken in accordance with an access licence (for wild harvest or the taking of specimens for ranching purposes) or an aquaculture licence - see the sections on aquaculture and commercial fishing above.

**Emu Farming**
Emu farming is carried out under the auspices of a Commercial Wildlife (Wildlife Producer) Licence Type 3 granted under the Wildlife Act 1995. Emu is the only native species permitted to be bred and destroyed under the provisions of the Wildlife Regulations 1992 (as listed by schedule 7). The licence authorises the holder to possess, keep, breed, destroy, display, process and dispose of emus.

There are also many conditions attached to these licence. These include that the emus are:

a) held on specified premises under the direct supervision of the licensee;
b) held in enclosures;
c) at stocking densities that comply with any specified requirements;
d) if destroyed, that this is done humanely so as to cause sudden and painless death; and
e) any facilities for destroying or processing be sited so that they do not disturb other wildlife held.

Live emus can be destroyed by the licence holder or by a meat processing facility without need for permit, if the facility is licensed under the Meat Industry Act 1993 and the birds are obtained from the holder of a Commercial Wildlife (Wildlife Producer) Licence Type 3 and are captivity-bred.

Emus bred for slaughter by the holder of a Commercial Wildlife (Wildlife Producer) Licence Type 3 can be processed be the licence holder or by the holder of a commercial licence (wildlife producer) licence type 2.

In addition to an annual licence fee (of $250 per licence), the licence holder must also pay a one-off fee of $300 paid to the Emu Industry Development Committee and make subsequent payments to the Committee of $2.50 per bird slaughtered.

Commercial farming is effectively precluded for the holders of a private wildlife licences, who, while permitted to keep or possess emus, are restricted to keeping no
more than ten emus (other than chicks under 4 weeks or eggs). A holder of a Commercial Wildlife (Wildlife Dealer) Licence Type 2 can also possess, keep, breed, buy, sell and dispose of emus.

A case study of how one obtains the relevant certification to breed emus in captivity and sell their eggs is included at the end of the chapter - it is quite a complex process.

Game Meat Processing
Game meat processors operate under the auspices of the Meat Industry Act 1993 and the Wildlife Act 1995. Wildlife Act authority is required for the killing or processing of any native ‘wildlife’, other than emus if obtained from a licensed emu farmer - as noted in the previous section. The required authority is a Commercial Wildlife (Wildlife Producer) Licence Type 2. This authorises the holder to “possess, keep, buy, sell, dispose of, and process dead wildlife as listed by schedule (schedule 5(B) and 7). The scheduled species currently include:

- Common brushtail possum;
- western and eastern grey kangaroos;
- whiptail wallaby;
- common wallaroo;
- red-necked wallaby;
- red kangaroo;
- Tasmanian pademelon;
- freshwater and saltwater crocodiles; and
- emu.

As only the captive-bred emu may be killed in Victoria, all other species, consequently, must be obtained from outside Victoria.

It is thus also legal to process shells of emu eggs and infertile emu eggs, as long as wildlife from which they are derived were raised in captivity, and export or import products of certain macropods and the shells of emu eggs.

Honey
The provisions governing use of native plants for the production of honey are restricted those associated with obtaining access rights to Crown land.

Access to flora for the purposes of honey production on Crown land is permitted under three forms of licence:

- bee farm licence - section 141;
- bee range area licence - section 147; and
- apiary licence - section 149.
There are no prescribed assessment criteria, but by administrative decision they are not granted in areas of intensive recreation or areas of high conservational value. Most current sites are the legacy of historic access or rationalisation.

Where the land comes under the auspices of the Forests Act 1958 a Forest Act licence is required as honey and beeswax comes under the definition of ‘forest product’ and the removal of any forest product requires a licence or permit (under section 52).

**Hunting**
Recreational hunting is undertaken under the auspices of a game licence issued under the Wildlife Act 1975 (section 22A). A licence holder is permitted to hunt, take or destroy game (which, as previously noted, includes one native species of quail and a number of native ducks). To hunt game during a declared season a person requires a game licence as well as a firearm licence.112

Game licences are subject to endorsement for one of the following:
- a) for game birds, not including duck;
- b) game birds including duck;
- c) game birds including duck and deer; or
- d) game birds not including duck and deer; and deer.

The holders of licences endorsed for duck hunting are required to pass a ‘waterfowl identification test’ and the fees are proportional to the extent of the entitlement. No other form of competency is required.

Under the Wildlife Act 1975 (section 28A) the Secretary may also give written authorisation - to hunt, take or destroy wildlife if he or she is satisfied that the authorisation is necessary under defined conditions - damage, conservation management and so forth.113 114 Employees of licence holders may also hunt endangered, notable and protected wildlife.115 Such provisions are, however, in effect, for control of wildlife, rather than aimed at providing for a form of recreation.

Recreational hunters do not require a game licence to hunt ‘pest’ animals, a category, as previously noted, includes one native species - the dingo (as well as rabbits, foxes, and so forth).

**Kangaroo Harvesting**
The commercial harvesting of any native vertebrate animal, other than fish and declared ‘game’, is not permitted in Victoria.116 While the Act itself does not preclude harvesting (‘take’) per se; this is only permitted by the holder of an appropriate licence.

Under the Wildlife Regulations 1992, only the holder of a ‘commercial wildlife (wildlife controller) licence - type 1’, of which there are currently 17 such licence holders in Victoria, or the holder of a ‘commercial wildlife (wildlife controller) licence - type 2’
(venomous snakes only) is permitted to ‘take’ wildlife from the wild in Victoria. Such
a licence holder can only take animals with the consent of the land-owner and only
“take, destroy and sell or dispose” of the wildlife in accordance with conditions that
may be specified.

Species that may be taken are defined by schedule to the Wildlife Regulations 1992 and
currently include three species of kangaroo - eastern grey kangaroo, western grey
kangaroo, and the swamp wallaby (eleven species of native bird including cockatoos,
duck, emu, silver gulls, the common brushtail possum, common wombat and all
venomous snakes can also be taken).\textsuperscript{117} There are no criteria defined as to the
circumstances under which an animal can be taken or on the number than can be
taken, although these may be specified as a condition of the licence.

In addition, the Secretary may give written authorisation to hunt, take or destroy
wildlife for control purposes.\textsuperscript{118} If undertaken under such an ‘Authority to Control
Wildlife’, the species is specified on the Authority. Most such control Authorities are
granted for the control of kangaroos.\textsuperscript{119}

Under current administrative practise no commercial utilisation of the carcass or hide
is permitted.

\textbf{Live Animal Trade - Wholesale, and Pet and Aquarium Trade - Retail}
The commercial trading of all species of native vertebrates other than fish requires
authorisation under the \textit{Wildlife Act 1995}. There are restrictions on the types of native
wildlife a person can trade and these are based on the type of wildlife licence the
person holds. The main relevant licence is the commercial wildlife (wildlife dealer)
licence. There are two forms of this licence. A ‘Type 1’ Licence holder is authorised
to possess, breed, buy, sell and dispose of those taxa of wildlife listed in Schedules 1, 2
and 4 of the \textit{Wildlife Regulations 1992}, whilst the ‘Type 2’ holder also has access wildlife
in Schedules 3 (Part A) and 7.\textsuperscript{120} There are common restrictions on holders of both
types of licence, including, for example that they must operate from a premises
nominated on the licence, they are confined to dealing with living wildlife, and that
they cannot charge for displaying their wildlife. Their purchase of wildlife also is
subject to various conditions.\textsuperscript{121}

The Secretary may also give written authorisation to persons to buy, sell, acquire or
receive wildlife,\textsuperscript{122} if one of the various stated conditions are satisfied.\textsuperscript{123}

Persons may not import and export wildlife into and out of Victoria unless they have
an import and export permit from the Secretary.\textsuperscript{124} The Secretary must issue such a
permit if various conditions are satisfied.\textsuperscript{125}

It is legal to trade in ‘listed’ as threatened (under the \textit{Flora and Fauna Guarantee Act
1988}) or fish declared as ‘protected aquatic biota’ (under the \textit{Fisheries Act 1998}) with
the necessary licence and authorisation. The operators of aquaria (that is, persons creating a habitat for and/or hatching, rearing, breeding, displaying or growing specified fish or fishing bait or other commercial purposes) require an aquaculture licence under section 43 of the Fisheries Act 1995 (under regulation 637 of the Fisheries Regulations 1998; if there is no entry fee a licence may not be required). The species permitted are specific to each licence - most are limited to a small number of species. There are no specific controls affecting the trade of other live fish, whether native or not.

There are no special provisions relating to the trade of invertebrates (unless they are a ‘listed’ threatened species (under the Flora and Fauna Guarantee Act 1988), declared as ‘protected aquatic biota’ (under the Fisheries Act 1998) or a ‘fish bait’ species (under the Fisheries Act 1998), in which case trade is permitted subject to authorisation.

**Recreational Fishing**

The Fisheries Act 1995 and the associated Fishing Regulations 1998 provide for, and regulate, fishing for non-commercial or recreational purposes, that is, forms that exclude the sale of fish.

Take of any ‘fish’ requires a licence, of which there are two categories relevant for recreational anglers:

a) a recreational fishery licence; and
b) a recreational netting licence - entitling the holder to use a mesh net in specified lakes (27 lakes in all).

The entitlements and general conditions of recreational fishery licences are clearly defined in the Fisheries Regulations 1998. The holder of a recreational fishery licence is authorised:

a) to take, or attempt to take, fish other than for sale from inland waters by the use of recreational fishing equipment other than a recreational mesh net; and
b) to take or attempt to take, rock lobster from marine waters other than for sale by the use of a recreational hoop net or by hand; and
c) to use or possess a recreational hoop net in, on or next to Victorian waters.

Since 15 July 1999, a fishing licence is also required to fish in bays, inlets, estuaries and marine waters, as well as inland waters.

The holders of a recreational netting licence are authorised to use a recreational mesh net in 27 inland lakes defined by schedule. These licences are to be phased out - by 1 September 2000 recreational use of netting in inland waters will be prohibited.

An innovation of the 1995 legislation was the introduction of ‘Group Recreational Fishery Licences’. These provide for the representative of a group to hold a licence, under which other members of the group can take fish.
As with commercial fisheries, the Minister, may appoint a Fishery Committee, under Section 93 of the Act, to provide advice on the management of the fishery and the preparation of fishery management plans.

An array of restrictions apply – encompassing catch size, size and sex of individual specimens, seasons, fishing techniques and so forth. These restrictions are prescribed in the Fisheries Regulations 1998. Recreational fishing is prohibited from a number of defined waters, including many domestic water storages and may be prohibited or regulated in any ‘fishery reserves’ declared under Section 88 of the Fisheries Act 1995. Park regulations under the National Parks Act 1975, may preclude the taking of native fish, including molluscs and crustaceans in certain parks.

In practise, however, most native fish can be caught in the majority of Victorian waterways. The holder of recreational fishing licence is not allowed to trade fish.

**Research**

A licence is required under the Prevention of Cruelty to Animals Act 1986 for:

- a) the carrying out of scientific procedures on or in connection with animals [vertebrates and crustaceans] on specified premises or a specified part of the premises forming part of the establishment; and
- b) the carrying out of approved field work by the establishment.\(^{134}\)

The breeding of any animal (animals are defined as any non-human vertebrate as well as crustaceans) for the sale to a scientific establishment for experimentation also requires the breeder to be licensed - a breeding establishment licence under section 29 of the Prevention of Cruelty to Animals Act 1986.\(^{135}\)

The Fisheries Act 1995 also provides for the granting of a general permit which authorises the taking of fish for research, aquaculture, educational and scientific purposes and the selling or disposing of fish obtained under that permit.\(^{136}\) This permit can be varied by regulation and have conditions inserted or changed\(^{137}\) by the Secretary of the Department of Natural Resources and Environment.

Most other more general research is undertaken under permit issued by the relevant land management authority.

One submission considered that the current wildlife laws made it illegal for an amateur naturalist to ‘impede the natural progress’ of wildlife.\(^{138}\) This was considered an impediment to the activities of amateur naturalists - as “it is virtually impossible to uphold this law and at the same time study native reptiles and frogs in a fruitful manner”.\(^{139}\) It was also submitted that it was difficult for amateurs to obtain research permits in Victoria (especially in comparison with the authorities in South Australia).\(^{140}\)
Subsistence and Cultural Use
There is provision within the Wildlife Act 1975 that allow Aboriginals, with written authority from the Secretary, to use wildlife for “aboriginal cultural purposes”. This provision does not specifically exclude commercial activity.

The Fisheries Act 1995 has, as one of its objectives, the facilitation of Victorian fisheries for “traditional uses”, however, the Act does not include any provisions that are specific to such use.

Taxidermy
If a taxidermist works on native mammals, birds, reptiles, and amphibians a wildlife licence under the Wildlife Act 1975 is required. The licence applies to the operator, not the business, although, under the Wildlife Regulations 1992, premises at which the specimens are held must be specified in the licence (regulation 20).

Of the 17 categories of wildlife licence prescribed under the Wildlife Regulations 1992, two permit the processing of ‘wildlife’ for the “purpose of preserving, preparing and mounting, and restoring parts or complete specimens of [defined] species of dead wildlife ...”. The two licences are:

a) a Commercial Wildlife (Wildlife Taxidermist) Licence Type 1; and
b) a Commercial Wildlife (Wildlife Taxidermist) Licence Type 2.

A Type 1 licensee is restricted to operations on common native species (and game) that do not require a licence to breed or sell (as listed in Schedule 5, Part A and Part C of the Wildlife Regulations 1992). A holder of a type 2 licensee can process any wildlife that is permitted to be kept in Victoria (that is all those animals listed in Schedules 1 to 4 and 7 of the Wildlife Regulations 1992).

There are no separate requirements to obtain either licence; the only difference is in the associated fee, which is higher for the Type 2 licence. The only prerequisites are those generic for all wildlife licences, covering age (Wildlife Regulations 1992 regulation 18) and whether the applicant is “a fit and proper person to hold the licence applied for” or has previously been found guilty of an offence under the Act, the suitability of the premises, and so forth, as determined by the Secretary.

Ecotourism - Wildlife Parks and Botanical Gardens
Zoos and wildlife parks come under the auspices of two Acts - the Wildlife Act 1995 and the Zoological Parks and Gardens Act 1995. The latter Act is only relevant to the public zoos administered by the Zoological Parks and Gardens Board at Royal Park, Werribee, and Healesville, although there is a provision (under section 24) for other lands of reserves to be declared to come under the management of the Board.
Part IX of the Wildlife Act 1995 differentiates between a:

a) zoo - “any place where a collection of zoo-animals [that is defined exotic animals] is kept for public viewing, entertainment or amusement ...” (A zoo may also keep ‘wildlife’);

b) animal exhibition - “any collection of zoo animals or wildlife or both that is displayed or kept in connection with the conduct of a circus, sideshow, or travelling show of any kind”; and

c) wildlife park - “any place where a collection of wildlife is kept or retained for public viewing, entertainment or amusement”.

Any person conducting an animal exhibition or operating a zoo is required to be the holder of a licence, other than in a number of prescribed circumstances. The duration of a zoo and animal exhibition licence is generally 12 months from the date of issue but there is provision for variation to the terms of these licences. There are no provisions prescribed for the operators of a ‘wildlife park’.

One of the commercial wildlife licences under the Wildlife Regulations 1992 provides for and regulates the keeping of collections of wildlife - the Commercial Wildlife (Wildlife Displayer) Licence.

This licence entitles the holder to possess, keep, breed, sell, buy, display or dispose of wildlife in permanent and fixed facilities at specified premises. Any one displaying wildlife, including at other sites, is required to present an educational or conservation theme. There are many conditions attached to this form of licence but the key ones are that the display must minimise the risk of escape by the wildlife and injury to humans.

It is not clear whether the operator of a zoo which keeps ‘wildlife’ also requires a commercial wildlife licence.

In addition, the Wildlife Act 1995 includes a form of licence termed ‘commercial wildlife (wildlife demonstrator) licence’. Holders of this form of licence have similar entitlements to those of the holders of private licenses but, in addition, the licence specifically permits various aspects of public display and demonstration, subject to minimising the risk of escape of the taxa and risk to persons. The holder may only have in his/her possession a maximum of ten self-sufficient specimens (ie adult) and their non-self sufficient offspring.

Botanical Gardens are generally created and managed under the Crown Land (Reserves) Act 1998 or the Royal Botanic Gardens Act 1991. There are no specific restrictions on the use or management of native plants under the relevant provisions of these Acts.
Issues

There is a complex and large of array of legislation affecting the various sectors of utilisation. The level of control applied is highly variable and the basis for such variability is not always obvious. There is duplication of control, especially for those sectors affected by tenure-based controls. The granting of licences under some provisions is based on well defined criteria and subject to statutory conditions, for others the processes are rather laissez faire. Requirements for the monitoring of performance and review are highly variable.

PROTECTION OF ECOLOGICAL AND BIODIVERSITY VALUES

In the following section the Committee considers regulatory controls that relate to the objective of ensuring that utilisation does not compromise ecological and biodiversity values. The following areas are covered:
   a) avoiding extinction;
   b) avoiding deleterious effect on the welfare or conservation of utilised taxa;
   c) prevention of cruelty;
   d) avoiding deleterious effect on the conservation of other taxa;
   e) ensuring ecologically sustainable development; and
   f) protection of habitat and potentially threatening processes.

A brief comparison of regulatory controls affecting exotic species with those of native species is also included.

Perhaps the prime overriding provision is in the Flora and Fauna Guarantee Act 1998 which includes a requirement that a Flora and Fauna Guarantee Strategy be prepared and that it must include proposals that guarantee the survival, abundance and evolutionary development of all flora and fauna in the wild.  

Avoiding Extinction

The primary legislative instrument that responds to the most basic of biodiversity objectives, that of avoiding extinction, is the Flora and Fauna Guarantee Act 1988. The relevant provisions of this Act are restricted to dealing with species indigenous to Victoria. The first objective is to:
   guarantee that all taxa of Victoria's flora and fauna ... can survive [ie not become extinct], flourish and retain their potential for evolutionary development in the wild.

The key relevant provision of the Act is the placement of a species or flora or fauna community facing potential extinction onto a list of taxa and communities that are ‘threatened’ (under Schedule 2 of the Flora and Fauna Guarantee Act 1988). The Act provides this option for all biota with the exception of humans and certain taxa defined by schedule. The latter currently only include ‘human disease organisms’.
For any taxon of native flora and fauna to be placed on the ‘threatened’ list it must satisfy criteria defined by regulation. Currently, it must meet the following criteria:
   a) it is in a demonstrable state of decline that is likely to result in extinction;
   b) it is significantly prone to future threats likely to result in extinction;
   c) it is known to have occurred in Victoria after European Settlement but has not been sighted in the State for 40 years;
   d) its reproduction or recruitment has seriously declined or is not occurring;
   e) it is very rare in terms of abundance or distribution; and
   f) the threat is currently operating and is expected to operate at a level in future that is likely to result in extinction of the taxon.\textsuperscript{160}

For any flora or fauna community to be placed on this list it must also satisfy criteria defined by regulation. They are similar to those defined for individual taxon.\textsuperscript{161}

The listing process involves consideration by an independent scientifically-based committee, public comment, comment by other defined statutory bodies\textsuperscript{162} and decision by the Minister and Governor in Council.

Listing of a species or community brings into play a number of protective mechanisms:
   a) preparation of an action statement - obligatory;
   b) making of an interim conservation order to conserve the critical habitat (at the Minister’s discretion), with use permits only permitted by the ‘Director-General’ (now Secretary) after consideration of listed relevant matters.;
   c) suspension of any licences, permits or other authorities that may be in conflict with an interim conservation order - at the Ministers discretion;
   d) restriction of taking listed flora from Crown land or ‘critical habitat’ on freehold - obligatory other than for limited exceptions (no specific restriction if on freehold land not part of a defined ‘critical habitat’ area);\textsuperscript{163}
   e) restriction of taking fish, unless specifically authorised by the Governor in Council or if taken under licence granted by the ‘Director-General’ (now Secretary);\textsuperscript{164}
   f) restriction of taking and trading in invertebrate fauna (but only to the extent of protection offered by the Wildlife Act, which provides for take and trade under licence).

\textbf{Issues}
While the \textit{Flora and Fauna Guarantee Act 1988} is effectively all-encompassing, there are a few issues of potential concern or inconsistency. These include:
   a) listing requires nomination - there is no comprehensive process of assessment or monitoring of species’ populations;
   b) there may be a significant time delay between nomination and the decision on listing (not withstanding a requirement for consideration of nominations to be made “as soon as possible after [nomination]”);
c) many listed species do not have action plans, despite these being obligatory;  
d) preparation of an action plan is obligatory, implementation is not;  
e) there are no specific provisions for 'listed' vertebrate taxa;  
f) there are no specific provisions for 'listed' plant taxa on freehold land outside a declared 'critical habitat' area;  
g) there are no defined matters that must be taken into account before issuing a licence to take or trade in a 'listed' fish;  
h) there are no special provisions to restrict the take or trade in 'listed' vertebrates - other than that provided to most vertebrate wildlife under the Wildlife Act 1975.

Consequently, this legislation does not provide a fail-safe mechanism for avoiding the extinction of those species that may be subject to utilisation.

Notwithstanding these apparent shortcomings, the legislation does provide powerful tools to pro-actively protect habitat and maintain ecological processes and the Committee understands that the legislation has been a model for a number of other jurisdictions. However, the Committee notes that it has not been actively put into effect. In particular, there are currently no management plans prepared under the Act, no defined critical areas and no interim conservation orders.

The 'purposes' of the Wildlife Act 1975 also includes an objective of preventing “taxa of wildlife from becoming extinct”. However, the Act provides no special provisions to assist in the achievement of this objective, over and above its general protective provisions for all native vertebrate fauna. Indeed several of the 'listed' species under the Flora and Fauna Guarantee Act 1988 are also included on Schedules 1, 2 or 3 Part A of the Wildlife Regulations 1992. This means that these threatened species can be kept and traded by the holders of various private and commercial wildlife licenses under the same provisions as more common species.

Avoiding Deleterious Effect on the Welfare or Conservation of Taxa

The level of legislative protection and ability to influence the use of biota varies greatly according to the type of plant or animal. Whales have the highest level of protection (including restrictions on interfering with the animals); terrestrial invertebrates (unless a 'listed' species, ie one that is threatened with extinction) have none. Five different statutes provide protection, as previously discussed, according to the type of plant or animal. The level of protection is also dependent on, for some grouping of species, the tenure of the land on which they occur.

A key generic management process that is available are management plans made under the Flora and Fauna Guarantee Act 1988. These may cover “any taxon or community of flora or fauna or 'potentially threatening process'. Such plans are required, amongst
other things, to state the way in which benefit will be given to the taxon or community.

In addition the Prevention of Cruelty to Animals Act 1986 (section 7) provides for the Minister, with the approval of the Governor in Council, to prepare, vary or revoke any code of practice specifying procedures for the keeping, sale, hunting, shooting, catching, husbandry, housing for scientific research, etc., of any animal (animal being defined as vertebrate or crustacean). The same section also lists the many sources which may form the content of these types of Codes. Part 5 (sections 31-55) of the Conservation Forests and Lands Act 1987 deals with the procedures, preparation, approval, and contents of codes of practice.

One submission raised the importance of the distinction between animal welfare and animal conservation - that is between the welfare of individual animals or plants and the conservation of wild populations. It was noted that “current ‘protective’ legislation regulating research and trade in native wildlife is advocated as fulfilling both conservation and animal welfare concerns, whereas perhaps resources need to be ‘channelled more towards protecting populations and overall biodiversity rather than individual organisms’.

Vertebrate Fauna, Other Than Whales and Dolphins, and Fish
The Wildlife Act 1975 provides mechanisms for the protection of all indigenous vertebrates, other than humans and fish. The basic premise is that all species of vertebrate fauna indigenous to Victoria, other than fish, whales and dolphins are ‘protected’ - irrespective of whether they are part of a wild population or a captive population. The Act provides for the exclusion of species from this protection if:

a) it is a ‘pest animal’ as declared under the Catchment and Land Protection Act 1994 - by the Governor in Council on the Minister's recommendation following independent assessment against three defined criteria;

b) it is declared to be ‘unprotected wildlife’ - by the Governor in Council (no assessment criteria or independent process is required); and

c) it is declared to be ‘unprotected in an area’ of Victoria for a specified period - by the Governor in Council on the Minister's recommendation, if it is considered to be causing injury or damage to property, vegetation or other animal.

As previously noted, there is currently only one native animal declared as a pest animal - the dingo (Canis familiaris dingo), none declared ‘unprotected’ and five declared ‘unprotected in an area’.

There are four categories of pest animal of which native animals may only be declared as an ‘established pest animal’. With few exceptions, such declaration means that the animal cannot be imported, kept or sold, and land owners can be directed to control and “as far as possible eradicate” the animals. Hunters can also hunt and kill such animals. The declaration of ‘unprotected in an area’ may include conditions
and restrictions. For example the current declarations restrict killing to landowners engaged in “the rural production of commercial crops”, and also restrict the method of control.

While classification as ‘protected wildlife’ means that the taking or trading of the animal is not permitted, the Act does provide for take, trade, keeping and breeding if licensed or otherwise authorised by the Secretary or if exempted by regulation. These provisions are for various situations as follows:

a) wildlife licences - these can be subject to “any conditions, limitations and restrictions” as may be defined by the Secretary and must not be granted if it “would be deleterious to the welfare or conservation of … [the wildlife]”,

b) game licences - these can be subject to “any conditions, limitations and restrictions” as may be defined by the Secretary and are restricted to hunting, taking or destroying game as declared by the Governor in Council. A game licence must not be granted if it “would be deleterious to the conservation [but not the welfare] of any taxon or any kind of game”.

c) authorisations - for certain specified purposes and subject to “any conditions, limitations and restrictions” as may be defined by the Secretary;

d) exempted by regulation - currently, under the Wildlife Regulations 1992, there are no restrictions on the keeping or breeding (or for some species, trading other than from a shop) some 24 common species listed by Schedule, including king quail, budgerigar, zebra finch, cockatiel, two species of dove, three species of cockatoo, dingo, and a number of frogs, lizards and tortoises.

Other than for species exempted by regulation, the legislation thus provides wide scope to place conditions on the utilisation of vertebrate wildlife. Such conditions could encompass welfare and conservation aspects of such use.

In practise, most conditions are prescribed by regulation according to the category of licence (wildlife licences) or category of endorsement (game licences). The main types of conditions used are:

a) on the applicant - age and good character;

b) on the premises - which may need to be specified and meet requirements as to size and so forth;

c) on the species - (no formal assessment criteria applies, but may be listed on the advice of the Wildlife Possession, Trade and Advisory Committee);

d) on tracking movement, by way of record keeping, transfer papers, and tagging - some licences only; and

e) on the numbers of wildlife held or taken, such as bag limits (some licences only).
The Wildlife Act and the Wildlife Regulations also make other provisions for the welfare and conservation of encompassed fauna. For instance:

A licence or written authorisation is required to wilfully molest, disturb, chase, herd, separate or injure protected wildlife during the close season\textsuperscript{188}.

The Secretary may give written authorisation to hunt, take or destroy wildlife if he or she is satisfied that the authorisation is necessary for the care, treatment or rehabilitation of sick or injured animals.\textsuperscript{189}

Wildlife that is not self sufficient must not be bought, sold, transported, disposed of, conveyed or controlled without specific authorisation of the Secretary or unless the situation falls within listed exceptions.\textsuperscript{190}

Persons who hold a Commercial Wildlife Dealers Licence must provide other individuals who buy or accept their wildlife with printed information setting out the requirements for the proper feeding, care, housing and welfare of the wildlife bought or accepted.\textsuperscript{191}

Animals declared to be ‘unprotected’ or ‘unprotected in an area’ are not subject to any form of monitoring – such species (with the exception of the common brushtail possum) can be taken and destroyed without any requirement for record of the number taken or indeed an assessment of the numbers occurring in the locality prior to being taken.

The\textsuperscript{192}\textsuperscript{193}\textsuperscript{194}\textsuperscript{195} Prevention of Cruelty to Animals Act 1986 also applies to vertebrate fauna, other than humans (see section below) but not if the treatment of the animal is undertaken in accordance with Catchment and Land Protection Act 1994 (for example controlling a ‘pest’ animal’) or the Wildlife Act 1975 (for example under the auspices of a wildlife licence), nor if the treatment is carried out in accordance with a ‘Code of Practise’.

\textbf{Whales and Dolphins}

Whales and dolphins are not subject to most of the general provisions applying to ‘protected wildlife’, but are, however, covered by similar provisions under other clauses of the Wildlife Act 1975.\textsuperscript{192} These provisions make it an offence, other than in certain restricted circumstances, to kill, take or interfere with a ‘whale’, irrespective of whether in the wild or captive. These provisions do not, however, apply if the action was taken under a permit granted by the Secretary.\textsuperscript{193}

A permit can only be granted for specified purposes, and subject to specification of the type and number of ‘whales’ affected, and record keeping requirements.\textsuperscript{194} A permit is not permitted to be granted “if the Secretary is satisfied that the grant of a permit will adversely affect a population of a particular taxon of whale”.\textsuperscript{195}

The\textsuperscript{196} Prevention of Cruelty to Animals Act 1986 also applies to whales and dolphins (see section below) but not if the treatment of the animal is undertaken in accordance with
the Wildlife Act 1975 (for example under the auspices of a permit), nor if the treatment is carried out in accordance with a ‘code of practice’.

**Fish and Specified Aquatic Invertebrates**
The Fisheries Act 1995 is the key legislation that provides for the general welfare and conservation of ‘fish’. The term ‘fish’ includes not only fish, but aquatic molluscs, crustaceans (most, but not all of which are aquatic), echinoderms (all marine), and any other species of aquatic invertebrate declared by Order in Council to be ‘fish’. The declaration of additional aquatic invertebrates is not subject to any defined criteria or process of independent assessment.

Unlike the basic premise of the Wildlife Act 1965, the Fisheries Act 1995 is based on the premise that all ‘fish’ can be taken unless otherwise prescribed.

The Act, however, includes a number of mechanisms that can be used to assist with the welfare or conservation of ‘fish’. These include:

a) management plans (for example for a fishery management plan - which must identify critical components of the ecosystem, and current or potential threats to those components);
b) regulations - which may cover, for example the type of equipment used;
c) licences - access licences (commercial), fish receivers licences, aquaculture licences, recreational fishery licences;
d) general permits - for specified purposes, subject to “any conditions that the Secretary thinks is appropriate”;  
e) quotas on catch - for a specific period, fishery, zone or access licence as proclaimed by the Governor in Council on the recommendation of the Minister; or by the Secretary;  
f) closures - by time period, fishing method or species, as defined by regulation or ‘fisheries notice’;  
g) size and catch limits - as defined by regulation.

Such mechanisms apply irrespective of whether the ‘fish’ is part of a wild or captive population.

Examples subject to current Fisheries Regulations are the setting of minimum sizes for the catching fish found in Victorian water, the setting of catch limits, the requirement to keep monthly catch records, the declaration of closed seasons and the prohibition on the use of certain equipment or fishing techniques.

There are substantial penalties for breaches of these conservation measures in relation to fish. There are also restrictions or prohibitions on the use of various forms of fishing equipment in named stretches of Victorian inland waters.

There is also further provision in the Fisheries Act 1995 for the Governor in Council, by order, to declare any taxon or community of flora or fauna to be ‘protected aquatic
biota’ for all or part of the State. There are no criteria for declaration. The implication of such protection is restricted to direct take of the biota - it makes it an offence to take, injure, keep, release or sell any declared protected aqua biota. However, a permit can be granted to permit such take at the discretion of the Secretary or by Order in Council, unless the Secretary considers it inconsistent with any relevant management plan or the welfare of any relevant fishery or aquatic ecosystem. Of the species currently declared as protected aquatic biota, all are marine. Regulations may also prohibit the taking of invertebrates.

The Fisheries Act 1995 (Vic) uses the concept or term ‘priority species’ to protect fish that occur in limited numbers and to create special conditions in relation to the legal commercial taking of such species. To date these provisions have only been used for marine species.

Another provision, relevant to welfare, is:

Persons with access licences must immediately return to the water with the least injury possible any species of fish not covered by the particular licence.

The Prevention of Cruelty to Animals Act 1986 also applies to fish and crustaceans (see section below) but not to recreational or commercial fishing if carried out in accordance with the Fisheries Act 1995, or if the treatment of the animal is undertaken in accordance with a ‘code of practise’. In effect, fish are not subject to the Act.

**Terrestrial Invertebrates and Unspecified Aquatic Invertebrates**

Other than aquatic invertebrates declared as ‘fish’ under the Fisheries Act 1995 and any species listed as threatened under the Flora and Fauna Guarantee Act 1988, there is no legislative provision for the general welfare or conservation of invertebrates. Examples of such unprotected invertebrates include beetles, butterflies and moths, spiders, terrestrial snails, sponges, sea anemones and corals.

Despite the lack of protection or ability to regulate or monitor take, micro-organisms are of vital importance to ecosystems.

**Microbiota**

There is no legislative provision for the general welfare or conservation of microbiota.

**Plants**

The Flora and Fauna Guarantee Act 1988 is the main Victorian legislation that provides for the general protection of native plants (other than of plants with value for timber production). However, such protection only applies if the plant has been declared as ‘protected flora’ by the Governor in Council. There are no defined criteria or independent assessment required for declaration. As previously noted, only approximately 25 percent of Victoria’s native flora is so designated.
If a taxon is classified as ‘protected flora’ a number of provisions come into place, most notably that “a person must not take, trade in, keep, move or process protected flora ...”. However, a number of exemptions are provided:

a) if the taking was accidental;
b) if taken by the owner of the land or agent (unless part of a its defined ‘critical habitat’) and not traded - that is there is effectively no provision for regulation of plants on freehold lands;
c) if the flora was propagated from flora that was lawfully obtained and kept; or
d) if it was taken under licence, permit or Governor in Council Order.

Licences and permits and Governor in Council Orders must not be granted if in the opinion of the ‘Director-General’ (now Secretary) or the Governor in Council considers that it “would threaten the conservation of the taxon of community of which the flora is a part”; or, in the instance of a permit, the Director-General considers that “the flora is a serious cause of injury to property, crops, stock or listed taxa or communities of flora or fauna.” There is no specific power to make conditions on licences or permits in the legislation (although it may contain “those terms and be limited in those ways which the Director-General thinks is necessary”).

Other welfare provisions provide for confidentiality of information:

The Director-General with the approval of the Minister may declare information about flora and fauna to be confidential if the Director-General is of the opinion that the disclosure of that information is likely to result in an unreasonable level of harm being done to the flora or fauna or its critical habitat.

Issues

There is an array of primary legislation that includes provision for applying welfare or conservation measures to flora and fauna. This legislation variously:

a) applies different approaches to the same issues;
b) has similar but slightly different provisions for the same matters; and
c) may or may not define criteria and assessment processes for discretionary approvals.

Notably all vertebrate animals other than fish are subject to protection unless specifically excluded, where as fish and aquatic invertebrates and flora are unprotected unless specifically declared a ‘protected’ species. Terrestrial invertebrates and microbiota are not only generally unprotected, but there is no enabling provision to provide for their welfare or conservation should this be desired (unless they are considered to be threatened with extinction).

Even where a species is declared as a ‘protected’ species, this does not necessarily invoke clauses managing its use.
The legislation generally makes little differentiation between use of wild populations and captive or cultivated populations.

**Prevention of Cruelty**

Other than the general provisions for welfare outlined in the previous section, the key legislation addressing cruelty is the *Prevention of Cruelty to Animals Act* 1986. Under this legislation, there are various offences in relation to the infliction of cruelty or aggravated cruelty on animals - the definition of ‘animals’ is sufficiently broad to cover native fauna.

This legislation makes it an offence to act cruelly, as defined in a number of clauses, to a vertebrate animal or crustacean. These clauses include any action which:

- wounds, mutilates, tortures, overrides, overdrives, overworks, abuses, beats, worries, torments or terrifies an animal;
- overloads or overcrowds an animal;
- drives, conveys, carries or packs an animal in a manner that may cause unnecessary pain and suffering;
- abandons “an animal of a species usually kept in a state of confinement or for a domestic purpose”.

The legislation also prohibits certain activities such as using baits and lures, trap-shooting, and leg-hold trap, and regulates scientific procedures undertaken on animals and in any associated breeding establishments.

Section 42 of the Act provides for the Governor in Council to make regulations for, amongst other things, “the conditions under which animals may be kept in captivity, including the sizes of enclosures and cages” and minimum standards of licensed scientific and scientific breeding establishments.

A key provision of the legislation is the making of a ‘codes of practice’, which may be made by the Minister with the approval of the Governor in Council but is subject to disallowance by either house of Parliament. A ‘code of practice’ may specify:

- Procedures for the keeping, treatment, handling, transportation, sale, killing, hunting, shooting, catching, trapping, netting, marking, care, use, husbandry or management of any animal or class of animals.

The Act does not, however, include any requirement for a code of practice to be applied. The incentive for their use is that the provisions of the Act do not apply to any treatment of an animal undertaken in accordance with a ‘code of practice’. Further, there are no defined criteria of requirement for independent assessment of a ‘code of practice’.
The Act also does not apply to:

a) slaughter of animals in accordance with the Meat Industry Act 1993 or any Commonwealth Act; 230
b) anything done in accordance with the Catchment and Land Protection Act 1994; 231
c) anything done in accordance with the Wildlife Act 1975; 232
d) recreational fishing or angling conducted in accordance with the Fisheries Act 1995; 233 and
e) commercial fishing or fish processing conducted in accordance with the Fisheries Act 1995. 234

There are also a number of relevant provisions under the Wildlife Act 1975 which affect non-fish vertebrates. Persons engaged in licensed commercial fishing are immune 235 from prosecution if the killing, taking, injuring or interfering with whales was carried out in humane way to prevent the ‘whale’ from suffering. Holders of a Commercial Wildlife (Wildlife Producer’s) Licence Type 3 must ensure that any wildlife that needs to be destroyed under licence is killed humanely in a sudden and painless way. 236 All wildlife housed or transported under any wildlife licence must be protected from predators and unauthorised persons. 237

**Issues**

A code of practice can be used as a defence to prosecution under the Act, however, a code of practice may contain procedures involving cruelty - there is no requirement under the Act for any procedure included in a code of practise to not be cruel. Consequently a code of practice could be used to escape liability under the Act, that would otherwise apply.

In addition, virtually all consumptive use of vertebrate native fauna is undertaken under the auspices of the Wildlife Act 1975 and the Fisheries Act 1995, thus taking them outside the jurisdiction of the Prevention of Cruelty to Animals Act 1986.

**Avoiding Deleterious Effect on the Conservation of Other Taxa**

**Cross-breeding**

The only statutory provision dealing with cross breeding relates to non-fish vertebrate fauna:

A person must not permit different taxa of wildlife to inter-breed unless those taxa of wildlife are known to inter-breed in the wild. 238

**Release into the Wild**

The Flora and Fauna Act 1988 includes a provision (section 49) that makes it an offence, without permit, to abandon or release any ‘prescribed’ flora into the wild. However, as at 30 June 1999, no flora has been so ‘prescribed’, in effect negating the value of the provision.
The Wildlife Act 1975 includes a provision (section 52), that makes it an offence, without a permit, to “release from captivity or confinement in circumstances which makes recovery impossible or uncertain” any ‘wildlife’ or any other proclaimed animal.

Under the Fisheries Act 1995, declared ‘protected aquatic biota’ can only be released into Victorian waters with permit, and declared ‘noxious aquatic species’ can not be released into Victorian waters or any aquarium, hatchery or any other waters whether or not private property. The Fisheries Regulations 1998, also includes a regulation (regulation 530) that makes it an offence to “stock fish into any Victorian waters”, other than in accordance with a licence or other authority.

There is no restriction on the release of terrestrial invertebrates.

**Issues**
The available provisions for managing potential deleterious effect of utilisation on non-target species are of variable application and quality.

**Ensuring Ecologically Sustainable Development**
The requirement for an activity to be undertaken in an ecologically sustainable manner is referred to in some of the relevant legislation. Most commonly such references are found in the general objectives of the relevant legislation. For example:

a) the objectives of the Fisheries Act 1995 include a number of references to ecological sustainability - “to provide for the management, development and use of Victoria’s fisheries, aquaculture industries … in an efficient, effective and ecologically sustainable manner”, and “to promote sustainable commercial fishing ….”; 239

b) the objectives of the Wildlife Act 1975 includes - “to establish procedures in order to promote … the sustainable use of and access to wildlife ….”; 240

c) one of the objects of the Conservation, Forests and Lands Act 1987 is to make productive, educational and recreational use of the State’s flora and fauna in an environmentally sound way; 241 and

d) the first broad objective of the Fisheries Regulations 1998 also refers to sustainability - “to provide for the control and management of fisheries in Victoria on a sustainable basis”. 242

There are, however, virtually no direct references to ecological sustainability within the various sections of the legislation, including those sections outlining criteria for the granting of licences and permits for use. A notable exception is in the legislation dealing with fish.

Under the Fisheries Act 1995, a fisheries management plan must be consistent with the objectives of the Act (that is including those regarding sustainable use) and is “to specify policies and strategies for the management of the fishery … on an ecologically
sustainable basis having regard to relevant commercial, recreational, traditional and non-consumptive uses.”

The concept of sustainable yield is used in the Forests Act 1958, but it only applies to hardwood sawlog supplies taken from Victorian forests - not forest produce such as non-timber native plants.

Other references may be less direct. For instance, the Joint Authority of the Commonwealth-State Management of Fisheries has amongst its various functions the obligation of ensuring that “resources are not endangered or over exploited”.

Techniques for ensuring a sustainable level of harvesting are generally of two types - input controls and output controls. The major form of input control is undertaken through limiting the number of people who can take biota, by requiring a licence or permit and, more effectively, restricting the number of licences allocated. Output controls include measures such as limiting the number of specimens that may be taken or kept.

Issues

There are effectively no legislative requirements for utilisation activity to be undertaken in a manner consistent with the principles of ‘ecologically sustainable development’, nor for approval to take ESD issues into account.

Requirement for a utilisation activity to be undertaken in an ecologically sustainable manner is of variable application and quality.

Protection of Habitat and Potentially Threatening Processes

There are a number of provisions in a variety of statutes that provide for the protection of public land habitat. These include:

a) parks and reserves under the National Parks Act 1995;
b) reserves under the Crown Land (Reserves) Act 1978;
c) fisheries reserves under the Fisheries Act 1995 (section 88) - not specifically restricted to public land but declared waters only;
d) State wildlife reserves and nature reserves under the Wildlife Act 1975;
e) prohibited areas under the Wildlife Act 1975 (section 33) - covering habitat of any taxon of wildlife in which persons are prohibited from entering; and
f) forest parks and reserves under the Forests Act 1958 (section 50 reserves).

There are no provisions that specifically apply exclusively to freehold lands, other than controls that may be included in planning schemes under the Planning and Environment Act 1987.

With the exception of one of the Wildlife Regulations, which states that “all persons must not wilfully damage, disturb or destroy any wildlife habitat”, and the provisions
of the Wildlife Act 1975 for the declaration of any locality as a ‘wildlife management co-operative areas’ (for which a ‘scheme of operation’ may include measures to restore or improve wildlife habitat), the only statute that generally provides for the protection of habitat is the Flora and Fauna Guarantee Act 1988.

This last Act gives the ‘Director-General’ (now Secretary) the authority to determine the habitat of any taxon or community of flora or fauna (whether ‘listed’ or not) that is critical to the survival of that taxon or community. The determination of an area as ‘critical habitat’ is, however, of no statutory consequence unless it is the ‘critical habitat’ of a ‘listed’ species or community (or a species or community nominated for listing) and subject to an interim conservation order made by the Minister. The objective of an interim conservation order is to conserve the critical habitat of a listed or threatened species of flora and fauna.

An interim conservation order can prohibit or regulate any activity or process that takes place in that habitat or, if it adversely affects that habitat, any activity that takes place outside that habitat. Landholders or managers of land or water which forms part of that critical habitat are required to comply with that order and the Order prevails over planning schemes. None-the-less landholders and water managers can seek a special permit to conduct activities within critical habitats. Further more, an Order cannot be made for the ‘critical habitat’ of a ‘listed’ community on private land.

The Flora and Fauna Guarantee Act 1988 also provides for the designation and management of ‘threatening processes’ and are subject to provisions similar to those described above for taxa and communities - they may be ‘listed’ (on schedule 3 of the Act) if they meet prescribed criteria laid down in the Flora and Fauna Guarantee Regulations 1990, and if so listed must be subject to an action plan and may be subject to a management plan.

Issues
Issues relating to habitat protection are taken up in the next chapter - Chapter 10.

Controls Relating to Native Species Compared to Exotic Species

Wild Harvest
There are controls on the wild harvest of a number of exotics, including for the protection of fish and game, as well as for certain specified ‘noxious weeds’ and ‘pest’ species. Indeed the controls, as outlined above, for the wild harvest of native species may be less than that of some exotic species.

Farmed or Cultivated Species
There are effectively no differences between statutory controls applying to cultivated native and exotic plants.
With respect to native fauna, there are clear differences. Persons who farm native fauna are required to meet the requirements of the Wildlife Act 1975 or the Fisheries Act 1995 as well as any other more general requirements that may apply to any farm operation. Not only do these requirements include the need for licensing, keeping of books, preparing returns and payment of fees, but they also control trade. Permits are required to import and export between states, and there are controls over the source of animals and to whom the animals and products can be sold.

Some of those involved expressed the opinion that such impositions act to discourage use of native fauna. For example one submission pointed out, in relation to controls on the harvesting of tree ferns from private land that:

The State presently encourages only exotics and uses regulations as a disincentive to utilise native flora. The landholder risks losing ownership of their product to the state of Victoria if the product is a native. Currently I am free to grow any exotic tree fern on my property without restrictions, but if I plant a native tree fern, I am faced with regulations when I wish to sell it from the DNRE. It is common sense to grow what grows naturally in an area. 255

The Committee understands, however, that the restriction of trade only relates to wild harvest, not to plants that are propagated from a legal source.

**Issues**

There is a clear difference in the nature of regulatory controls affecting wild harvest to those applying to farmed vertebrate fauna. The need for strict control of fauna farmed in ‘closed system’ operations is, arguably, less than that of fauna farmed in ‘open systems’.

**PROVISION FOR CONSIDERATION OF ECONOMIC WELFARE AND WELL BEING**

**Taking into Account Economic Issues**

There are a number of legislative provisions that require the taking into account economic welfare matters in the Fisheries Act 1995. For instance the Joint Authority of the Commonwealth-State Management of Fisheries (albeit a marine water mechanism) has amongst its various functions the obligation of achieving the optimum utilisation and equitable distribution of the living resources of Victorian waters. 256 Fisheries management plans must, amongst other things, identify economic values and factors. 257

A number of provisions of the Flora and Fauna Guarantee Act 1988 also include such provisions. The Flora and Fauna Guarantee Strategy must be achieved with minimum adverse affect on the social and economic rights of landholders. 258 Economic matters must also be considered in drawing up an action statement for each new species added
to the list of threatened taxa. In making or amending management plans for such flora and fauna the ‘Director-General’ (now Secretary) must consider economic matters.

Two of the matters required to be considered in granting permits to landholders and managers of areas of ‘critical habitat’ are social and economic issues.

One of the objects of the Conservation, Forests and Lands Act 1987 (Vic) is to make a productive, educational and recreational use of the State’s flora and fauna in an economically efficient way.

**Ability to Trade**
The relevant legislation offers the opportunity to undertake trade in a wide array of biota. Of the 17 classes of wildlife licence, 16 permit the trading of animals (but only of those species included on a schedule to the Wildlife Act 1995). All fishery access licences permit trading, with few restrictions on the species permitted to be taken or sold under inland fishery access licences and aquaculture licences. All ‘protected’ flora can be traded under licence or without licence if propagated from legal stock, with no restrictions on unprotected flora.

**Royalties**
In virtually all instances of biota taken from the wild, there are no requirements for the payment of royalty - in effect a payment to the community.

Small royalties must be paid by those licensed to take wildlife from the wild (that is holders of commercial wildlife (controller) licences and commercial wildlife (producer) licences) in relation to certain native wildlife.

No royalty payments are required for the taking of fish, nor of native plants. Nor are royalties payable for the use of biota - rather licence fees are required to be paid.

All licence fees are paid into consolidated revenue, although revenue from recreational fishing licence fees is allocated for fishery management.

**Private Versus Commercial**
The term ‘private’, as compared with ‘commercial’, when used in relation to wildlife licences, is confusing. Holders of any type of private wildlife licence can in fact buy and sell wildlife - there is a definite commercial element to their licence.

It seems that under a ‘private’ wildlife licence the holder can do many of the same things that one can do under a ‘commercial’ wildlife licence. The are only a few differences between a private and commercial licence (apart from the higher licence fees of the latter), including:

a) the holder of a ‘private’ licence (some classes) cannot operate from a shop or business premises;
b) private licence holders cannot keep more than 10 emus (whereas there is no limit on the relevant commercial wildlife licence holder);
c) private wildlife licence holders cannot sell wildlife that has not been in their possession for at least six months; and
d) all commercial licence holders must display signs in the prescribed manner.\(^\text{265}\)

Such differences as do occur does not mean that a private wildlife licence holder cannot operate on a commercial basis (neither licence has any limit on the numbers of wildlife, other than emus, that may be kept or traded).

The distinction is also made between private (recreational) and commercial licences in the Fisheries Act 1998, but under this statute only the holder of a commercial licence is allowed to trade biota.

No difference is made with respect to permits for the use of ‘protected’ flora.

**Welfare of Persons Employed in a Utilisation Industry**
The Fisheries Act 1995 has as one of its objectives the promotion of the welfare of persons engaged in commercial fishing.\(^\text{266}\)

**Wildlife Which Represent an Unacceptable Risk to Human Safety**
There are a number of provisions that specifically allow for exceptions to protective requirements where meeting these would risk human safety. Examples include:

a) the holder of a Commercial Wildlife (Wildlife Controller) Licence can take or destroy venomous snakes which are presenting an unacceptable risk to human safety;\(^\text{267}\)

b) the holder of a Commercial Wildlife (Wildlife Displayer) Licence must display various wildlife, including venomous snakes, in such a way as to minimise the risk of injury to humans;\(^\text{268}\)

c) persons engaged in licensed commercial fishing are immune from prosecution if the killing, taking, injuring or interfering with whales was necessary to prevent risk to human health;\(^\text{269}\) and

d) under the section 28A(1) of the Wildlife Act 1975 the Secretary may give written authorisation to hunt, take or destroy wildlife if he or she is satisfied that the authorisation is necessary to ensure the health and safety of persons.

**Control of Fauna**
The holder of a commercial wildlife (wildlife controller) licence can take or destroy taxa as listed in Schedule 6 of the Wildlife Regulations 1992 and other taxa specified in the licence.\(^\text{270}\) There are many conditions attached to the licence, for example holders can only use equipment specified in the licence and sell only to authorised persons or organisations.\(^\text{271}\) There are two Types of this licence, the main difference between them being that the Type 2 licence authorises the holder to take and destroy
venomous snakes\textsuperscript{272} and the Type 1 licence requires the holder to mark Sulphur Crested Cockatoos, Galahs and Long Billed Corellas.\textsuperscript{273}

Population management of ‘super-abundant’ species has been attempted by non-lethal methods (such as sterilisation) as well as by cull\textsuperscript{274}. Where these methods prove inadequate a license to cull or capture may be obtained under the Wildlife Act 1975 (section 28A). For example, shooting of the protected eastern and western grey kangaroo has been done by landowners under permit in certain areas of Victoria and, since 1990, the Government has undertaken a kangaroo-culling program in the Hattah-Kulkyne National Park.\textsuperscript{275}

Galahs, cockatoos and long-billed corellas, taken by commercial wildlife controllers are the only species that may be harvested and sold in Victoria (and a royalty paid).\textsuperscript{276}

Throughout Victoria, Long-Billed Corellas, Sulphur Crested Cockatoos and Galahs are declared ‘unprotected wildlife’ (subject to a number of conditions, limitations and restrictions specified in the Order). Wombats are also unprotected in certain areas. Where these species are shown to be causing serious damage to crops, land owners and managers are permitted, under strict conditions, to kill them.\textsuperscript{277} Holders of the Commercial Wildlife (Wildlife Controller) Licence can only take those Common Brushtail Possum which are causing damage or creating a nuisance to a residential or commercial building.\textsuperscript{278}

\textbf{Issues}

The legislative provision for the consideration of economic welfare and well being is highly variable.

It has been suggested that the funds from licences and fees associated with the utilisation of native flora and fauna be used for:

environmental rehabilitation and prevention of land degradation. These funds should not replace existing funding sources.\textsuperscript{279}

\section*{PROVISION FOR EQUITY}

\textbf{Allocation of Access}

In effect any person who meets any required technical requirements is granted access on an equal basis. There are a few exceptions. These are:

a) persons may be required to be deemed ‘a fit and proper person’ - which, in effect, means that they have not been successfully prosecuted for a wildlife or fishery offence;

b) some fisheries may be ‘closed’ - that is, the number of entrants is restricted. Holders of current licences retain their entitlements unless relinquished voluntarily or bought out (paid compensation);
c) there is no provision for the tendering of the right of access to natural resources - fees relate to cost recovery, with a premium for greater rights being provided; and

d) as previously noted, special rights of access may be provided to indigenous people - under the Wildlife Act 1975 the Secretary may give written authorisation to hunt, take, destroy, buy, sell, keep, possess, breed, etc., wildlife if he or she is satisfied that the authorisation is necessary for, inter alia, aboriginal cultural purposes and one of objectives of the Fisheries Act 1995 is the facilitation of Victorian fisheries for “traditional uses”, which implies fishing by Aboriginals.

Best Practice
There is legislative provision for the Fisheries Co-Management Council to prepare and distribute codes of practice regarding fishery licence or permit holders in relation to ‘best practices’ concerning any matter relevant to those permits or licences.

One submission to the Inquiry pointed out, in relation to controls on the harvesting of tree ferns from private land that:

There are no restrictions on cutting heads off the tree ferns in young [pine] plantations, grazing them to death, spraying them with chemicals, [bull]dozing them, burning them or giving them away. The only restriction is on utilising them for the purpose of sale.

Issues
The legislative provision for the consideration of equity issues is highly variable.

IMPORT-EXPORT ISSUES

Victoria has a naturally diverse ecology. The access to this biodiversity is a competitive strength for many native flora and fauna industries. A key issue is the tension between maintaining Australia’s access to exotic genetic material while effectively managing access to Australia’s biological resources. Should Australia restrict access to its native species, other nations may limit our access to their species.

Australia is a signatory to the Convention of Biological Diversity and is also (since 1993) a signatory to the FAO International Undertaking on Plant Genetic Resources. These oblige Australia to preserve its genetic resources and to make them available to other countries upon their request.

Under the Convention on International Trade in Endangered Species of Wild Flora and Fauna (CITES) Australia is obliged to control the export and import of native species. Environment Australia manages Australia’s these obligations under the Wildlife Protection (Regulation of Exports and Imports) Act 1982, and is responsible for the issuing of all permits for the import and export of native flora. The Australian
Customs Service is then responsible for inspecting consignments to ensure they match the permits.\textsuperscript{283}

**The Wildlife Protection (Regulation of Exports and Imports) Act 1982**

This Wildlife Protection (Regulation of Exports and Imports) Act 1982 is a Commonwealth Act that addresses conservation issues relating to the import and export of native flora and fauna. The key provisions are Sections 10 and 10A. These provide for the export of artificially propagated plants without control under these Sections. There are two ways in which export permits may be obtained. Individuals may apply for permits on a case-by-case basis. Alternatively, Environment Australia can issue an Authority for businesses in States that have in place a Management Plan for the artificial propagation and commercial wild harvest of native flora.\textsuperscript{284}

Under Sections 10 and 10A, States are required to have legislation in place that enables the regulation, protection and management of species across all tenures. In Victoria, The Flora and Fauna Guarantee Act 1988 and the Wildlife Act 1975 meet this requirement for many species.

**Environment Australia**

Environment Australia, a federal agency, is responsible for the Wildlife Protection (Regulation of Exports and Imports) Act 1982. In addition it has responsibility, inter alia, for development of federal policy in relation to ESD and application of the Convention of International Trade in Endangered Species (CITES). It also assists in the coordination of State activities in these areas.\textsuperscript{285} In relation to ESD, objectives are maintenance of ecosystems, numbers of species, genetic integrity and population structures.\textsuperscript{286} Activities under the Convention of International Trade in Endangered Species relate to most exports of native species and imports of listed species.\textsuperscript{287} Environment Australia has a research budget that is used for investigating matters associated with monitoring and regulatory supervision.

**Management Programs Of Harvested Species**

Where a native species is to be harvested for export the exporting State is required to prepare a management program or plan as specified by Section 10 or conform to a ‘Controlled Specimen Requirement’ under section 10A of the Wildlife Protection (Regulation of Exports and Imports) Act 1982.\textsuperscript{288} The former is the more rigorous approach. It is appropriate where proposed export is substantial and there is good knowledge of the distribution, abundance and biology of the species. Currently five States have management programs for the harvest and export of kangaroos. Even though Victoria processes and exports kangaroo products, a Victorian management program is not required because the export products are made from animals harvested outside the State.
Management plans indicate how a species will be managed, something of the species' biology, the harvest regime intended, how many people will be involved, and so forth.

Environment Australia provides guidelines and help to proponents of management programs and 'controlled specimen requirements'. Plans are on display for a one-month period for public comment and then assessed by Environment Australia. If the Minister is then satisfied that there is sufficient information on the species and that long-term impacts will be negligible, approval for the Plan (possibly with conditions to ensure sustainability) may be given.

A 'controlled specimen declaration' involves the proponent (not necessarily a State government) in a similar process. However, the Minister can issue a Declaration after “taking account of", rather than “being satisfied about the requirements under the regulation”. Lower standards of knowledge concerning the specimen are accepted.

Plans developed under management programs contain review provisions aimed at ensuring implementation of the plans and continual improvement of management.

Management programs are prepared by the State government. These programs can (and should) function on a regional basis. Not all do so.

In the last approximately two years, ten to eleven management programs have been developed, all for vertebrate animals, and application has been made for more than 100 ‘Controlled Specimen Requirements’. All current native plant exports from Victoria come under the latter. At present most management programs are for selected kangaroo and wallaby species. Variations between these tend to relate to differences in monitoring methods and are a result of differences in the habitats in which the species occurs.

Quota's used in kangaroo management programs are based on the work of Caughley et al. Codes of practice for kangaroo harvest are enforceable through the carcass inspection process.

State flora management plans currently exist in Queensland and Western Australia, but actions are being taken by other States, including Victoria, to produce such management plans including Victoria.

Under Section 10A a ‘Controlled Specimen Requirement’ can be developed by anyone, though the State must still have the capacity to monitor the ‘Requirement’ – ie legislation in place to control domestic as well as export use of the species concerned.

The only native species exported from Victoria are soft tree ferns (Dicksonia antartica) and a small quantity of wildflowers. At present this occurs under ‘controlled specimen declarations’. According to Environment Australia, the former could be dealt with appropriately under a management plan as there is adequate information on the
species’ distribution, abundance and biology. For the other species presently exported the ‘controlled specimen declaration’ is considered appropriate given the present state of knowledge and size of export.

**Export Permits**
Under the *Wildlife Protection (Regulation of Exports and Imports) Act 1982*, where a management program or ‘controlled specimen declaration’ is in force, application can be made for an export licence. A licence must accompany export of any native wildlife. A range of permits are also available. A permit may be issued for one consignment only for unlimited quantity and unlimited number of specimens. An ‘authority’ may be issued for a period of 12 months, within which the exporter effectively writes his/her own licence for each consignment within appropriate restrictions. A new system is being implemented to apply to kangaroo exports. This will use an ‘authority’ but applies to kangaroos only.

**Exempt Species**
Schedule 4 of the *Wildlife Protection (Regulation of Exports and Imports) Act 1982* lists species that are exempt from the Act. Since recent review of the Schedule, these include:

a) species taken for commercial aquaculture where the species in the wild is not generally subject to commercial harvesting;

b) a plant specimen that: is a registered cultivar of an Australian native species; is a hybrid involving at least one Australian native species where the species do not naturally hybridise (and the product is infertile); or has been given protection under the *Plant Breeders Rights Act 1994*; and

c) the plant material is derived from cultivated material.

Specimens within these categories are not subject to export controls.

**Issues**
Export controls are a federal responsibility, however, if Victorian management and regulation of a sector meets Commonwealth standards - and if such management system is registered with the Commonwealth - this would greatly assist Victorian industry obtain export licences.

It is possible for an approved management program to cover an entire State, part of a State or encompass an area straddling a State border. It may also cover one or more species. No Victorian management program has been approved by the Commonwealth to date (no has such approval been sought).

Victorian exporters of native flora raised concerns to the Cut Flower and Nursery Industry Task Force about the long time taken for the issuing of export permits by Environment Australia. The Cut Flower and Nursery Industries Regulatory Reform
Task Force identified a number of impediments that need to be addressed in order to expedite the issuing of export permits.

A key issue of concern was that, unlike Western Australia and Queensland, Victoria does not have in place a State Management Plan for the artificial propagation and commercial wild harvest of native plants. Victorian exporters of native flora therefore face a greater regulatory burden in obtaining export permits than their competitors in States that do have a Plan in place. The Task Force recommended that the Department of Natural Resources and Environment develop a State Management Plan as a matter of priority.

The Committee notes that a Management Plan is currently being developed by the Department of Natural Resources and Environment for the harvesting of tree ferns, and understands that one for flowers and foliage is proposed.

Quarantine Issues

Federal legislation also deals with issues of disease. Under this legislation an AQIS inspector inspects carcasses as they come into the abattoir to ensure that they are fit for human or animal consumption.

Currently no consideration is required to be given to the threat imposed by an exported species on the receiving environment. Informally warnings of potential pest hazard can be given.

Issues

There is some duplication, as noted by the Cut Flower and Nursery Industry Task Force, between the federal quarantine and inspection services.

Import - Export Between Australian States

Section 50 of the Wildlife Act 1975, makes it an offence to import wildlife into Victoria from another State or export wildlife from Victoria to another State without a permit issued by the Secretary - such a permit cannot be withheld if the specimens are lawfully obtained and kept no health or safety risk.

An example of the administrative process that is involved in transferred animals in and out of Victoria is provided in the Case Studies at the end of this chapter.

Issues

The variance of legislation between States and the Commonwealth was considered by Birds Australia to complicate enforcement of regulations designed to protect native flora and fauna. This point was also taken up by the Victorian Herpetological Society Inc who considered that all of the current wildlife licensing systems could be more effective if:
Each were to come into line and develop a uniform set of regulations and schedules that do not differ so markedly from one another, as is currently the case. 296

There is perhaps scope for reciprocal arrangements to be made between the various States to assist reduce the level of paperwork.

Birds Australia made the point that:

Native flora and fauna (and in particular migratory birds) does not respect the artificial barriers such as national and State borders. Ideally there would be strong and uniform levels of protection for wild birds at all levels of government. 297

It is also not clear to the Committee how this sits with the constraint imposed by Section 92 of the Federal Constitution that effectively prevents State authorities from controlling interstate movement of fauna or their products. 299

INTELLECTUAL PROPERTY RIGHTS

The patenting system and the Plant Breeders Rights (PBR) system are two methods by which this can be achieved, by conferring legal titles in new plant varieties to their breeders or discoverers. 300 Patents relate to the development of new technologies, processes, substances and products, and may be applicable to the development of new plant varieties; Plant Breeders Rights is solely associated with the selection and breeding of new varieties of plants, fungi, algae and transgenic plants. 301

The Australian Plant Breeders Rights system is administered under the Plant Breeders Rights Act 1994 by the Plant Breeders Rights office within the Commonwealth Department of Agriculture, Fisheries and Forestry. 302 The Australian Plant Breeders Rights scheme provides exclusive commercial rights to breeders in Australia for 20 to 25 years, and provides the opportunity for equivalent rights to be filed in foreign countries. 303 Breeders may license PBR varieties to growers on condition that a royalty is paid on subsequent plant or seed sales, or they may also undertake the propagation and marketing of the variety themselves, gaining a direct return on plant sales. 304 Trademarks, while not protecting the use of a variety, can be used to protect symbols, words or devices used in the marketing of a particular variety.

Several Victorian companies provide overseas growers, under license, with propagules or cuttings of native plants for use as nursery plants or ‘potted colour’. 305 The mature plants are then marketed and sold overseas under an Australian trademark. In other instances, Australia is only involved with the initial selection and breeding of material, which is tested by overseas companies under agreement. 306 Product development and marketing is left to the overseas company, who can better assess its profitability for their situations. According to one expert, realistic testing for the world market is beyond the scope of most growers in Australia. 307
The stated intention of the original legislation (the Plant Variety Act 1987) was that it would not apply to selections from a natural or wild environment; rather it was a scheme for new plant inventions. In 1989, however, Australia joined the International Convention for the Protection of New Varieties of Plants (the UPOV Convention), which allowed varieties to be protected under the Act, irrespective of whether they arose from deliberate cross-breeding, or were selected from wild populations. The Plant Breeder's Rights Act 1994 confirmed this, and wild varieties that were ‘discovered’ and then ‘bred’ to produce a stable line, could qualify for Plant Breeders Rights.

Controversy remains over the interpretation of ‘breeding’ in the Act, and the extent to which the selection and subsequent propagation of wild-selected species conforms to the intent of the Act.

There is also currently considerable debate worldwide over the granting of intellectual property rights in plant material. At the Rio Earth Summit in 1992, two agreements relating to the conservation and utilisation of plant genetic resources were signed. The Convention on Biological Diversity, to which Australia is a signatory, is a legally binding agreement that asserted the sovereign rights of nations over their biological resources, while providing that there be ‘fair and equitable sharing of benefits arising from utilisation of genetic resources’. Agenda 21 is a non-legally binding document that calls on governments to share the benefits of biodiversity and biotechnology with developing nations, and to develop plans for the in situ and ex situ conservation of biological resources.

As noted in the previous section on Import-Export issues, Australia is obliged under international agreement to share its genetic resources to other countries upon their request. While the Commonwealth Department of Primary Industries and Energy undertakes this reporting for agricultural and food crops, there is no strategy for managing Australia’s plant genetic resources.

The Australian Plant Genetic Resources Advisory Committee established in 1992 developed a policy on Plant Genetic Resources for Food, Agriculture, Horticulture and Forestry which was submitted to the Standing Committee on Agriculture and Resource Management in 1994. No action has resulted to date.

In accordance with the Inter-governmental Agreement on the Environment signed in 1992 by the Commonwealth, State and Territories Heads of Government, the Australia and New Zealand Environment and Conservation Council (ANZECC) established a Task Force on Biological Diversity to report on the implications and manner of implementation of the Convention on Biological Diversity. It recommended that a Commonwealth State and Territory Working Group be established to investigate and report on the strengthening of existing controls governing access to genetic resources, including legislation.
Matters which the ANZECC report identified as possible requiring legislation include: the regulation of access to, collection of and export of genetic resources, particularly those of commercial benefit. The report suggests that requirements of ‘mutually agreed terms’ and ‘prior informed consent’ provide a legal basis on which a fee generating permit system could be constructed. 313

Prior to the Earth Summit, undeveloped genetic resources had been freely available to all without restriction based on a...

...widely held view in the developed world,... that all undeveloped genetic resources, including wild species,... are public goods, and should be freely available to all without restriction. Inbred lines, new cultivars, and other forms protected by patents or plant breeders’ rights should not be freely available to ensure that those who invest in their development receive a fair return.

Various non-government organisations, particularly the Rural Advancement Foundation International (RAFI), were concerned, however, that developed countries were ‘pirating’ agricultural crops developed by indigenous people worldwide. They argued that indigenous people have de facto intellectual property rights, through traditional usage and cultivation, in many of the plants now protected under PBR by developed countries314. In Australia, however, the vast majority of PBR applications are for ornamental plants, rather than agricultural species. The Committee notes that while it could be argued that de facto intellectual property rights exist where the intended use of a plant under PBR is the same as its traditional use, for example for food, the principles are unclear where the intended use of the plant under PBR is different from its traditional use. For example, where a native plant not traditionally used for decorative purposes is developed for ornamental use.

The Convention on Biological Diversity, by providing an opportunity for countries to gain greater control over their genetic resources, has thus created a radical change:

Many countries no longer regard genetic resources as the common heritage of mankind. Genetic resources, like other national resources such as oil and minerals, are widely regarded as national assets which, if they are valuable and therefore worth conserving, should be exploited for profit.

Jurisdiction over Australia’s indigenous biological resources is vested in both the State and Territory Governments, and the Commonwealth Government. The State and Territory Governments regulate the collection of and use of flora and fauna occurring on both public and private land under their governance; the Federal Government regulates the export of native flora and fauna. Commonwealth legislation relating to access to Australia’s biological resources does not yet exist.315 In 1994 a Commonwealth and State Government Working Group was established in recognition of the need for a national approach to policy and legislation in relation to this issue.
It is unclear how PBR legislation will fit into the principles established by the Convention of Biological Diversity.

**Issues**
These are all issues that are still to be pursued and resolved at, primarily a Commonwealth level.

**CASE STUDIES**
The Committee has included three examples of the application of the current legislative controls. The first demonstrates the apparent complexity of the controls to the uninitiated. The second case study indicates the frustration that may be caused by the variability of administrative discretion and perceived duplication involved in the application of the controls. The third case study is illustrative of the administrative processes involved to transport animals across State borders. Such issues may be compounded by imprecise definitions of key words in the legislation - some of these are also highlighted.

**The Breeding of Emus in Captivity and Selling their Live Eggs**
The specific uses to which a particular species of native wildlife can be legally put in Victoria are determined by two criteria namely:

a) the particular type or category of wildlife licence; and
b) whether or not that species is included in the list of wildlife contained in the Wildlife Regulations 1992 that can be legally utilised in a particular way in Victoria.

In relation to criterion (a) above, the various categories of Victorian wildlife licences are set out in the Wildlife Regulations 1992. Basically they are divided up initially into Private and Commercial Wildlife Licences; then, within those two groups they are given specific titles according to the form of usage or occupation (for example, the Commercial Wildlife (Wildlife Producer) Licence); some categories of licence are further divided into numbered types (for example, the Commercial Wildlife (Wildlife Producer) Licence is further divided into Types 1, 2 & 3).

In relation to criterion (b) above, the list of wildlife (by common and scientific name) that can be legally utilised in Victoria is set out in the seven Schedules of the Wildlife Regulations 1992.

Unfortunately, when describing these various categories of wildlife licence in the main text of these Wildlife Regulations, reference is not usually made to the actual names of the wildlife that can be used commercially or privately by the holder of the particular licence. Instead reference is just made to a particular Schedule or Schedules of those Regulations. As stated above, the Schedules list the common and scientific name of each species that can be legally utilised in Victoria. This makes it difficult and indirect.
for the reader or inquirer to work out if he or she can use a specific species of wildlife for a particular purpose.

As stated previously, the inquirer in our hypothetical example wishes to use the Wildlife Regulations to find out if he/she is legally permitted to operate a large scale business premises that breeds emus in captivity and then sells the eggs from those birds. At present one way he/she could answer his/her query would be to follow the three steps listed below:

a) look in the Schedules of these Wildlife Regulations to see under what Schedule number or numbers emus are listed (at present emus are listed in Schedules 5 (Part B), 6 and 7);

b) then look in the main text of the Regulations under the various categories of private and commercial wildlife licences (the ‘private’ licences are set out in regulations 24 to 28 and the commercial ones in regulations 29 to 35 of the Wildlife Regulations) to see if those particular Schedule numbers set out in point (1) above were mentioned. A quick examination of those regulations shows that one or more of these Schedule numbers are mentioned in regulation 25(1) of the Wildlife Regulations, which covers a Private Wildlife (Category Two) Licence; regulation 26(1) which covers a Private Wildlife (Category Three) Licence; regulation 30(2)(e), which covers Commercial Wildlife (Wildlife Controller) Licence Types 1 and 2; regulation 31(1) which covers Commercial Wildlife (Wildlife Dealer) Licence Type 2; regulation 34(2)(b) & (2A) which covers Commercial Wildlife (Wildlife Producers) Licence Types 2 & 3;

c) see which of those licences would allow both the breeding of emus in captivity and the selling of their eggs. A check of the conditions of those above listed licences shows that the holder of a Private Wildlife (Category Two) or (Category Three) Licence, or of a Commercial Wildlife (Wildlife Producers) Licence Type 2 or 3 can breed from emus (i.e. Schedule 7 wildlife) and sell them. However none of the explanations in the Wildlife Regulations 1992 (Vic) of the conditions of these licences expressly state that the holder can sell “fertile” emu eggs, though the holder of a Commercial Wildlife (Wildlife Producers) Licence Type 3 can dispose of “infertile” emu eggs to any person and can also sell emu eggs generally without the need for any special authorisation from the Secretary of the Department of Natural Resources and Environment. It is also worth noting that the holders of the above Private licences cannot either (a) have more than 10 emus of above 4 weeks age in their possession or (b) operate from a business premises or a shop.

It therefore seems from steps (1) to (3) above, that the most likely option for our hypothetical inquirer is to apply for a Commercial Wildlife (Wildlife Producers) Licence Type 3. There are other approaches which could answer this hypothetical query regarding the breeding of emus and the selling of their eggs, but they are equally indirect and complex.
The Wild Harvesting of Tree Ferns

The harvesting of tree ferns from public land in Victoria is prohibited. In 1998, 50,000 tree ferns were harvested from private land in Victoria, and a large number of additional specimens were imported from Tasmania. Tree ferns are harvested from private land under a permit system regulated by the Department of Natural Resources and Environment. All tree ferns sold in Victoria, including those from Tasmania, must be tagged. In some cases a planning permit from the local government authority is also required for harvest. Tree ferns that are exported also require a permit from Environment Australia.

The Committee was informed, by tree fern operators in the Otways region of Victoria, that current Departmental policy is frustrating their efforts to establish a viable and ecologically sustainable business that would bring revenue into their local community. The business is based on harvested tree ferns sold in domestic and export markets. These operators also harvest ferns as part of the establishment process for a self-sustaining tree fern plantation.

The Committee was informed that the system for the issuing of permits to harvest tree ferns from private land was ad hoc, inefficient and inconsistent. Various legislation and regulations administered by the State government, local government and catchment management authorities apply to the harvesting of tree ferns in Victoria. These include the Revised Forest Code of Practice, the Flora and Fauna Guarantee Act 1988, native vegetation retention controls, Planning and Environment Act 1987, and the Catchment and Land Protection Act 1994.

The Committee was advised that delays in the issuing of permits affects the viability of small businesses, and makes business planning difficult.

The Committee was also informed that, while the utilisation of tree ferns is heavily regulated on private land, thousands of tree ferns are bulldozed then burnt during tree clear-felling operations in State forests. Tree fern operators, rather than see a valuable resource ‘wasted’, would like to harvest tree ferns before logging operations commence.

Transportation of Native Animals Across State Borders

The following example of the correspondence, permit applications and the permits involved in the transport of captive native animals across a State border is of a person wishing to give a single talk on snakes. It involved a short visit across the border from South Australia (where the person lived), to Apsley in Victoria for a few hours to give a talk to the Apsley Lions club. In addition to undertaking the process outlined below, the person had to pay fees of $120 ($100 for a wildlife demonstrators permit and an additional $20 for an assistants permit).
An outline of the process undertaken is indicated below:

- 15/10/95 Application for a Commercial Wildlife Licence Application.
- 16/10/95 Application for DNRE Import permit to take snakes to Victoria.
- 16/10/95 Application for export permit from DNRE.
- 16/10/95 Application to DNRE to Import snakes back from Victoria.
- 16/10/95 Application for DNRE Export permit to return snakes to South Australia.
- 20/10/95 Application for Assistant’s Licence.
- 23/10/95 Letter to DNRE advising talk time and place and re wildlife demonstrators licence.
- 26/10/95 Letter from DNRE advising they will have to interview me and inspect our premises before granting demonstrators permit.
- 6/11/95 DNRE export permit to return snakes to South Australia.
- 6/11/95 Letter to DCNE requesting acceptance of DNRE rather than submit to inspection in South Australia by DNRE officers.
- 8/11/95 Letter from DNRE confirming my bone fide and conditions under which snakes can be transferred to and from Victoria and South Australia.
- 10/11/95 DNRE Import Permit.
- 17/11/95 Final notice for payment of Assistants Licence for helper.
- 23/11/95 Letter to DNRE re notice sent re payment of Wildlife Demonstrators Assistance Licence.
- 23/12/95 Letter to DNRE re necessity to lodge returns when already do it in South Australia.

Undated Letter from DNRE advising issue of Commercial Wildlife (Wildlife Demonstrators) Licence.

Confusing Legislative Provisions

Issues associated with the lack of precision in current legislation compound difficulties faced by potential utilisation industries - a number of key expressions used are not defined. For example:

a) the Flora and Fauna Guarantee Act 1988 does not define ‘controlling’, ‘move’ or ‘process’ (section 3(1)), but all of those terms are essential to an understanding of permissible or prohibited behaviour regarding protected flora in the Flora and Fauna Guarantee Act 1988 (under section 48);

b) section 3(1) of the Wildlife Act 1975 does not define ‘keep’, ‘control’, ‘destroy’, ‘process’, ‘take’, ‘acquire’, ‘breed’, ‘display’ or ‘dispose of’, but the meaning of all these terms are crucial to informing the holder of wildlife licence as to what behaviour he or she is legally permitted to perform;

c) the terms ‘controlled’, ‘endangered’, ‘notable’ and ‘protected’ wildlife are ill defined by the Wildlife Act 1975 - sections 3(1) & 47B; and

In addition different statutes may define the same word differently. For example, there is a variation between the Flora and Fauna Guarantee Act 1988 (section 3(1)) and the Wildlife Regulations 1992 (regulation 5), as regards the meaning of the term ‘take’.

The inclusion of non-indigenous species in some of the definitions or categorisations of wildlife, also makes the interpretation of certain Acts or provisions, from the perspective of native flora and fauna utilisation, difficult.

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3 TRAFFIC Oceania, *Written Submissions*, No. U42.

4 The purposes or objectives of a particular piece of legislation are usually stated in section 1 of the Act, or rule 1 of a set of Regulations.


7 *Fisheries Act 1995*, s. 1.

8 *Fisheries Act 1995*, s. 3.

9 *Wildlife Act 1975*, s. 1A.

10 The long title to the *Forests Act 1958*.

11 See *Fisheries Act 1995*, s. 28.

12 *National Parks Act 1975* s. 17B.

13 Priority species means abalone, rock lobster or any other species that the regulations class as that species— *Fisheries Act 1995*, s. 4(1).


16 Parts of reserved forests can be zoned separately to protect their beauty— *Forests Act 1958*, s. 42(6).

17 Wilderness Parks are designated in order to protect indigenous flora and fauna, etc. — s. 17A(2).

18 Section. 88 relates to declaration of waters which are critical habitats, required for hatching or spawning, etc. as “fishery reserves”.

19 It is an offence to hunt wildlife in a wildlife sanctuary without written authority of the Secretary— *Wildlife Act 1975* s. 35(2).

20 *Prevention of Cruelty to Animals Act 1986*, s. 14 — penalties for breaches of this provision are 120 units or 12 months imprisonment.

21 For example the *Wildlife Act 1975*, s. 78.

22 *Wildlife Act 1995*, s. 73.

23 *Fisheries Act 1995* s. 43.


25 *Wildlife Act 1975* s. 22A.


27 *Wildlife Act 1975*, s. 22.

28 For example *Flora and Fauna Guarantee Act 1988*, s. 53.

29 The *Flora and Fauna Guarantee Act 1988*, as a principal and empowering Act, contains a lot of the important detailed information as compared to its subordinate legislation, the *Flora and Fauna Guarantee Regulations 1990*. For example Schedule 2 of the 1988 Act contains a list of the names of endangered species, whilst other provisions in the Act list eligibility criteria for permits to take such species, as well as some of the key criteria for listing species as “threatened”. However even with this particular example, the subordinate legislation still contains some important details. For example the *Flora and Fauna Guarantee Regulations 1990* has a complete detailed description of all the criteria regarding eligibility for being listed as a threatened species, whereas the 1988 Act only has some of these criteria.

30 *Wildlife Act 1975*, s. 22(3)(a) & (b).

31 *Wildlife Act 1975*, s. 87(1)(c).

32 For example section 38(1) of the *Fisheries Act 1995* empowers persons to make regulations which set out the various categories of “access” licences for commercial fishing, whilst the *Fisheries Regulations 1998* lists the different classes of access licence for commercial fishing [rr. 210-203], the entitlements of holders of those various...
licences [rr. 204-231], any conditions that are attached to the licences [rr. 301-337] and administrative matters in relation to them [rr. 232-237].

33 Conservation, Forests and Lands Act 1987, s. 31.
34 Prevention of Cruelty to Animals Act 1986, s. 7.
35 Regulations may also be made under the Forests Act 1958 (s. 99(20)) to provide for the protection of trees in Crown lands reserved under the Crown Land (Reserves) Act 1978. Provisions relating to other Crown land are included in the Land Act 1958 (principally providing for grazing) and the National Parks Act 1975 (but its provisions and associated regulations effectively preclude the use of native plants other than for certain limited defined exceptions).

36 Notwithstanding any entitlements that may otherwise be given by the holder of a licence under the Fisheries Act 1995.

38 There are currently (as at July 1999) 269 listed species (141 plants and 128 animals) and only 84 approved action statements (covering 34 plants and 53 animals).
39 Flora and Fauna Guarantee Act 1988, s. 49.
40 Catchment and Land Protection Act 1994, s. 58, s. 59 (1).
41 Department of Natural Resources and Environment, Written Submissions, No. U67.
42 Flora and Fauna Guarantee Act 1988, s. 47.
44 Department of Natural Resources and Environment, Written Submissions, No. U67.
45 The listing of such species is a legacy of the now repealed Wild Flowers and Native Plants Protection Act 1958.
46 Flora and Fauna Guarantee Act 1988, s. 3.
47 Flora and Fauna Guarantee Act 1988, s. 49.
48 Forests Act 1958, s. 3.
49 Forests Act 1958 s 21(a).
50 Forests Act 1958 s 3.
51 Catchment and Land Protection Act 1994, s. 58(4).
52 Catchment and Land Protection Act 1994, s. 58, s. 59 (1).
53 Catchment and Land Protection Act 1994, s. 71.
54 Catchment and Land Protection Act 1994, s. 70.
55 Wildlife Act 1975, s. 78.
56 Wildlife Act 1975, s. 7A(1).
57 Victoria Government Gazette, No 84, 1 August 1984.
59 Victoria Government Gazette, G27, 10 July 1997, p. 1718.
60 Wildlife Regulations 1992, r. 30(2)(e)(ii).
61 Catchment and Land Protection Act 1994, s. 75(5).
62 Fisheries Regulations 1998, s. 201(1)(e) and (f).
63 Fisheries Act 1995, s. 69.
64 Fisheries Act 1995, s. 71; Or has a permit under the Flora and Fauna Guarantee Act 1988.
65 Fisheries Act 1995, s. 72(3)(a)(i).
66 Maroondah City Council, Written Submissions, No. U2.
67 Maroondah City Council, Written Submissions, No. U2.
68 That is the plant is obtained under licence or permit from the wild or from some one who has obtained the plant from the wild under licence or permit.
69 Wildlife Act 1975, s. 78(1)(g).
70 Wildlife Regulations 1992, r. 24.
71 Wildlife Regulations 1992, r. 25.
73 Wildlife Regulations 1992, r. 27.
74 Wildlife Regulations 1992, r. 28.
75 To keep venomous snakes, the licensee must be over 18 years in age or be able to demonstrate competency in handling such snakes.
76 Wildlife Regulations 1992, r. 21.
77 Other for species for which a licence is not required to keep a live specimen - that is any species on Schedule 4 of the Wildlife Regulations 1992.
78 Department of Natural Resources and Environment, Written Submissions, No. U67.
Preece, K., Department of Natural Resources and Environment, *Minutes of Evidence*, Melbourne 26 April 1999; and also

80 Preece, K., Department of Natural Resources and Environment, *Minutes of Evidence*, Melbourne 26 April 1999; and also


83 “Plant” means any member of the vegetable kingdom and includes any tree, vegetable, vine and edible fungi - *Plant Health and Plant Products Act 1995*, s. 3(1).

84 Under the *Wildlife Act 1975*, s. 28A(1)(b) & (d).

85 *Wildlife Act 1975*, s. 29(i).

86 Under the *Wildlife Act 1975*, s. 29.

87 *Wildlife Act 1975*, s. 78(1)(c),(d) and (f).

88 *Fisheries Act 1995*, s. 49(2).


90 Information provide by Jane Dyke, Environmental Research Coordinator, Flora and Fauna, Department of Natural Resources and Environment, 17.6.1999.

91 *Land Act 1958*, s. 125(f).

92 *Land Act 1958*, s. 130 (5A).

93 *Forests Act 1958*, s. 3.

94 *Forests Act 1958*, s. 21(a).

95 See sections 42 -which creates an offence to operate an aquaculture business without authorisation and 43 - grounds for granting the aquaculture licence.

96 *Plant Health and Plant Products Act 1995*, s. 3.

97 *Fisheries Act 1995*, s. 40(1).


99 *Wildlife Regulations 1992*, r. 16A(1)(b) & (7).

100 *Wildlife Regulations 1992*, r. 16D.

101 *Wildlife Act 1975*, s. 28A(2) & (3). The person seeking the authorisation must apply in the prescribed manner, provide the required information and pay the prescribed fee for the authorisation - *Wildlife Act 1975* s. 28A(4). The authorisation has a maximum duration of three years but it can be renewed - *Wildlife Act 1975* s. 28C.

102 *Wildlife Regulations 1992*, r. 34(2) - the holder of a Commercial Wildlife (Wildlife Producer) Licence Type 2 can possess, keep, buy, process, sell and dispose of dead emus.

103 Department of Natural Resources and Environment, *Written Submissions*, No. U67.

104 See *Wildlife Regulations 1992*, r. 34(3) to (5) [conditions attached to Type 1]; r. 34(6) [conditions for Type 2] and r. 34(7) [conditions for Type 3].

105 *Wildlife Regulations 1992*, r. 16A

106 *Wildlife Regulations 1992*, r. 34(2) - the holder of a Commercial Wildlife (Wildlife Producer) Licence Type 2 can possess, keep, buy, process, sell and dispose of dead emus.

107 Department of Natural Resources and Environment, *Written Submissions*, No. U67.

108 *Wildlife Regulations 1992*, r. 25(2)(f); 26(2)(f).


110 *Wildlife Regulations 1992*, r. 16B(1)(b) & (7).

111 *Wildlife Regulations 1992*, r. 16D.

112 *Wildlife Act 1975*, s. 58C(1) [10 penalty units for a breach of this section]

113 The authorisation may be subject to conditions or restrictions set by the Secretary or regulation - *Wildlife Act 1975* s. 28A(2) & (3). The person seeking the authorisation must apply in the prescribed manner, provide the required information and pay the prescribed fee for the authorisation - *Wildlife Act 1975* s. 28A(4). The authorisation has a maximum duration of three years but it can be renewed - *Wildlife Act 1975* s. 28C.

114 These conditions are: (1) because the wildlife is damaging buildings, vineyards, orchards, crops, pastures, habitat or other property owned by the person seeking the authorisation or property adjacent to that person’s own property or (2) for the management, conservation, protection or control of wildlife or (3) for aboriginal cultural purposes or (4) for education or research purposes or (5) for the care, treatment or rehabilitation of sick, injured or orphaned wildlife or (6) for the custody, care or management of wildlife including the supporting of a recognised wildlife management program or (7) for the purpose of ensuring the health and safety of persons.

115 *Wildlife Act 1975*, s. 47C.

116 Further more, wild-shot game is not permitted on commercial premises where food is cooked, without permission of the Secretary, under *Wildlife Regulations 1992*, r. 29.
As listed in Schedule 6 of the *Wildlife Regulations 1992*.

Also granted for wood duck on dams, and on occasion other species.

Wildlife Regulations 1992, r. 31(1) & (2).

Wildlife Regulations 1992, r. 31(3)(a), (d), (ha) & (hb).

Under the *Wildlife Act 1975*, s. 28A(1)(b).

Listed in the *Wildlife Act 1975*, s. 28A(1)(c) to (i).

*Wildlife Act 1975*, s. 50(1) & (1A).

These conditions are that the wildlife was lawfully obtained, was lawfully kept and can be lawfully moved or imported from another State or Territory; does not breach any Victoria or other State or Territory law in the process of exporting or importing; the exporting or importing does not pose a risk, prejudice or adversely affect any person, livestock, the conservation of any protected wildlife, the wildlife of the jurisdiction to which the wildlife is being exported; any persons involved in the export or import process must not, at the time of the application for the import/export permit, have had any licence, permit or authority under the *Wildlife Act 1975* suspended, cancelled or disqualified under s. 70 of that Act - *Wildlife Act 1975* (Vic) s. 50(2). Also the applicant must apply for this permit in the prescribed manner, pay the prescribed fee and the issued permit is subject to any conditions, restrictions or limitations set by the Secretary - *Wildlife Act 1975* (Vic) s. 50(3) – (5).


Sections 44, 45 & 47.

Regulations 401-407.

A recreational fishery licence is not required where (a) persons under 18 take fish for any other purpose than for sale or (b) a person takes a fish, other than a rock lobster, from marine waters for reasons other than for sale and the Minister has not published a notice under s. 48(1) – *Fisheries Act 1995*, s. 47

*Fisheries Regulations 1998*, r. 401.


Department of Natural Resources and Environment (1999), *New Recreational Fishing Regulations Introduced July 1999*, brochure.

*Fisheries Act 1995*, s. 46.

Prevention of Cruelty to Animals Act 1986, s. 26(1).

Prevention of Cruelty to Animals Act 1986, s. 29.

*Fisheries Act 1995*, s. 49(2).


*Wildlife Act 1975*, s. 28A(1).

Sections 3(d) & 29(1).

*Wildlife Regulations 1992*, r. 35(1).

*Wildlife Regulations 1992*, r. 35(2).


*Wildlife Act 1975*, s. 74A.

*Wildlife Act 1975*, s. 74D.

Section 72 of the *Wildlife Act 1975* was repealed in 1990, yet s. 74(4) of that Act, which deals with zoo licensees keeping and exhibiting wildlife, still refers to prohibition from penalties under s. 72.


*Wildlife Regulations 1992*, r. 33(3)(g).

*Wildlife Regulations 1992*, r. 32(1)(c)& (d), (2)(f) & (g).

*Wildlife Regulations 1992*, r. 32(2)(f) to (h).


These criteria are defined under the Flora and Fauna Guarantee Regulations 1990 Schedule 1 Item 7 – and currently are: it is in a demonstrable state of decline that is likely to result in extinction; it is significantly prone to future threats likely to result in extinction; it is in a demonstrable state of decline which is likely to result in a significant loss of its component taxa; it has decreased markedly in a short time as regards its distribution and that decrease is continuing; it has altered markedly in a short time within its composition and that alteration is continuing; it is very rare in terms of the total area it covers or it has a very restricted distribution or it has been recorded in only a few localities; it as regards its threat, this is currently operating and is expected to operate at a level in the future which is likely to result in its extinction.


Flora and Fauna Guarantee Act 1988, s. 47 and 48(5), unless the Director-General is of the opinion that the flora is a series cause of injury to property, crops or listed taxa or communities of flora or fauna.

Flora and Fauna Guarantee Act 1988, s. 52

As noted previously, there are currently (as at July 1999) 269 listed species (141 plants and 128 animals) and only 84 approved action statements (covering 34 plants and 53 animals).


Note, however, that the numbers in captivity may not reflect the conservation status of the species in the wild. For instance, the Princess Parrot is an endangered species (ie rare in the wild), but common in aviculture.

Prevention of Cruelty to Animals Act 1986, s. 7(1).

These sources include any matter in any document, code, standard, rule, specification, etc. - Prevention of Cruelty to Animals Act 1986, s. 7(2).

Referred to in the Forests Act 1958, s. 52B(2)(f). An example is the Code of Forest Practices for Timber Production.

Kearney, M., Written Submissions, No. U35.

ibid.


Wildlife Act 1975, s. 3; the criteria are defined in the Catchment and Land Protection Act 1994, s 67 - (a) it is established in the wild in Victoria; and (b) it is a serious threat to primary production, Crown land, the environment or community health in Victoria; and it should be eradicated or controlled or its spread in the wild should be prevented.

Wildlife Act 1975, s. 3.

Wildlife Act 1975 s. 7A(1) - if the particular wildlife is causing injury or damage to (1) any building, vineyard, orchard, garden or other property; (2) any crop, grass, trees or other vegetation or (3) any other taxon or kind of animal including fish.

And dingo hybrids.

Catchment and Land Protection Act 1994, s 67.

Catchment and Land Protection Act 1994, s 73.


Wildlife Act 1975, s. 22.

Wildlife Act 1975, s. 23(1)(c).

Wildlife Act 1975, s. 22A.

Wildlife Act 1975, s. 3.

Wildlife Act 1975, s. 22A(5)(c).

The Wildlife Possession, Trade and Advisory Committee has adopted five criteria to assist it with its assessment of applications. These are conservation status, pest potential, human health and safety, husbandry (including breeding), and the number in captivity.

Wildlife Act 1975, s. 58.

Wildlife Act 1975, s. 28A(1).

Wildlife Regulations 1992, r 12(2).

Wildlife Regulations 1992, r. 31(3).

Wildlife Act 1975, s. 75 - 85A.

Wildlife Act 1975, s. 78.

Wildlife Act 1975, s. 78.

Wildlife Act 1975, s. 78(3A).
The Governor is Council may set these quotas upon recommendation of the Minister – *Fisheries Act 1995* (Vic) s. 64(1). There is also provision for the Secretary to set individual quotas for access licences – s. 65 of the same Act.

*Fisheries Act 1995*, s. 68A; minimum sizes for various species of fish are set out in the *Fisheries Regulations 1998* r. 501.

For example, the trammel net is prohibited under the *Fisheries Regulations 1998* (Vic) rr. 508(1)(a) and 509.

For example, regulation 512 of the *Fisheries Regulations 1998* makes it an offence to take marine invertebrates in Port Phillip Bay.

Such as abalone and rock lobster.

In the *Prevention of Cruelty to Animals Act 1986*, s. 3(1) an “animal” is defined as a live member of a vertebrate species including any fish, amphibian, reptile, bird, live crustacean or non-human mammal.
Forests Act 1958, ss. 52A, 52D, 52E.
Fisheries Act 1995, s. 21(2)(a). This provision, however, only relates to marine fisheries.
Wildlife Regulations 1992, r. 9 [50 unit penalty for breaches of r. 9]
Wildlife Act 1975, s. 32.
Flora and Fauna Guarantee Act 1988, s. 20.
Flora and Fauna Guarantee Act 1988, s. 27(b) & (c).
Flora and Fauna Guarantee Act 1988, s. 36 – failure to comply with any notice of prohibition or compliance with result in an initial 100 unit fine and further 10 unit per day penalties.
Flora and Fauna Guarantee Act 1988, s. 26(c).
Fisheries Act 1995, ss. 21(1)(b) & (2)(b).
Fisheries Act 1995, s. 28(6)(f) & (g).
Flora and Fauna Guarantee Act 1988, s. 17(3).
Flora and Fauna Guarantee Act 1988, s. 23(1)(c) & (2)(a).
Conservation, Forests and Lands Act 1987, s. 4.
Section 50 of the Flora and Fauna Guarantee Act 1988, provides for the Director-General to determine royalties for the taking of wild flora - but none have been so determined.
Wildlife Regulations 1992, r. 38.
Wildlife Regulations 1992, r. 29.
Wildlife Regulations 1992, r. 30(2)(e)(ii).
Wildlife Regulations 1992, r. 30(2)(e)(iii).
Wildlife Regulations 1992, r. 32(2)(g) & (h).
Wildlife Act 1975, s. 76A(d).
Wildlife Regulations 1992, r. 30.
See Wildlife Regulations 1992, r. 30(2).
Wildlife Regulations 1992, r. 30(1A).
Wildlife Regulations 1992, r. 30(3).
Temby, I. (1998), Flora and Fauna Program, Department and Natural Resources and Environment, personal Communication, 26 October; and also Department of Natural Resources and Environment (1997), *Victoria’s Biodiversity, Directions in Management*, p. 34.
There are eight such controllers licensed under the Wildlife Act 1975.
Wildlife Regulations 1992, r. 30(2)(e)(ii).
Maroondah City Council, Written Submissions, No. U2.
Wildlife Act 1975, s. 28A(1)(a), (b) & (e).
Sections 3(d) & 29(1).
ibid.
ibid.
ibid.
ibid.
293 Access to Australia’s Biological Resources Discussion Paper (draft).
295 Birds Australia, Written Submissions, No. U30.
297 Birds Australia, Written Submissions, No. U30.
298 Commonwealth of Australia Constitution Act 1900 (UK).
305 Living potted flowering plants that are used for decoration instead of cut flowers.
As a signatory to the FAO International Undertaking on Plant Genetic Resources.
312 ibid, pp.163-170.
313 Access to Australia’s Biological Resources Discussion Paper (draft) XX (by whom?)
Wildlife Regulations 1992, r. 34(2A)(d).
Another approach, but also equally indirect, to answering the same query, would be to (a) first check the various categories of Wildlife Licences in the main part of the Wildlife Regulations [i.e. under regulations. 24 to 35 of those Regulations] and see which category of Licence allows the holder to breed wildlife [a check of the Licence categories in Appendix 2 shows that there are many licences that allow such behaviour]; (b) then go to the Schedule numbers at the rear of the Regulations and see which Schedules list emus [we know that they are Schedules 5 (Part B), 6 and 7 – see Appendix 1] and then (c) go back to the main part of the Regulations, look under those licence categories which allow breeding and see which ones also mention Schedules 5 (Part B), 6 and 7.

In some cases salvage is permitted on public land from approved roadworks or land designated for clearing.

Vulcz, L. K., Written Submissions, No. U50.

ibid.

ibid.

State forests are public lands managed for forestry and recreational and conservation purposes.

Venum Supplies Pty Ltd, Written Submissions, No. U16.

“Take” in the Flora and Fauna Guarantee Act 1988 (Vic) s. 3(1) means to kill, injure or disturb flora and fauna or to collect flora, whilst in the Wildlife Regulations 1992 (Vic) r. 5 it means to gain possession or control of wildlife by any means.

For example the definition of “wildlife” in the Wildlife Act 1975 s. 3(1) includes non-indigenous species and the Schedules in the rear of that Act list such species like deer and Japanese Quail.
CHAPTER 10
HABITAT PROTECTION

• INTRODUCTION
• VICTORIAN PROGRAMS
• INNOVATIVE INTERSTATE AND NATIONAL PROGRAMS
• FINANCIAL INCENTIVE PROGRAMS
• ZIMBABWEAN CASE STUDIES

INTRODUCTION

In its Report, Commercial Utilisation of Australian Native Wildlife, the Senate Rural and Regional Affairs and Transport References Committee considered that the traditional approach to biodiversity conservation of relying on the protection of representative areas was too narrow. It concluded that:

the nature of biodiversity conservation in Australia now depends very much on finding mechanisms, and particularly financial incentives, for natural habitat to be restored and conserved on private lands and that, if appropriately managed, commercial utilisation of wildlife is one such mechanism.

The basis for this conclusion is the proposition that:

when a value is placed on a species, an indirect value is placed on the habitat occupied by that species and an incentive to preserve habitat emerges.

The creation of a sustainable economic value of wildlife was thus a primary rationale for the Senate Committee’s advocacy of commercial utilisation and, in particular, of the sustainable harvesting of wildlife.

As was noted earlier in this report (Chapter 7) harvesting can have a direct impact not only on the population of the targeted species but also a range of indirect environmental impacts. Many species are also clearly suffering from environmental stress associated with current pressures affecting habitat.

While the harvesting of species may be one mechanism to create an incentive to protect private land habitat, in Victoria there is a range of other mechanisms, both financial and non-financial, available. These alternative mechanisms can avoid many of the detrimental impacts potentially associated with wild harvest, while providing for the utilisation of native species by other sectors. Some of these arise from statutory requirements for habitat protection; mostly the available mechanisms are voluntary programs.
In this chapter the Committee reviews such other mechanisms as are currently available in Victoria and elsewhere and that directly provide for the protection of habitat while also providing for utilisation not reliant on wild harvest.

**VICTORIAN PROGRAMS**

The Victorian context of habitat protection also includes a large public land estate of which some 16 per cent is within a park and nature reserve system, providing representation of the greater majority of land systems and vegetation systems of the State. The statutory regime affecting such lands, notably the National Parks Act 1975, provides for a range of non-consumptive utilisation, but is restrictive of uses that may compromise biodiversity and habitat-protection objectives. The habitat protection provided by the Victorian parks system is supplemented by an array of habitat protection programs that operate on private lands.

**Statutory Protection**

As noted by the Committee in Chapter 9, there are four statutory controls that provide for the protection of habitat on private lands. These are:

a) a regulation, under the Wildlife Regulations 1992, which states that “all persons must not wilfully damage, disturb or destroy any wildlife habitat”;  

b) provision for the designation of ‘wildlife management cooperative areas’ (under the Wildlife Act 1975);  

c) the designation and protection of ‘critical habitat’ under the Flora and Fauna Guarantee Act 1988; and  

d) controls that may be included in planning schemes under the Planning and Environment Act 1987.

**Wildlife Management Co-operative Areas**

‘Wildlife Management Co-operative Areas’ are a formal control available under the Wildlife Act 1995 for which declared areas and their ‘wildlife’ (as specified, but restricted to non-fish vertebrates) are subject to cooperative management. The cooperative management is between the Secretary and the land owner who may be another agency of the State or a private landowner.

The basic tool forming the cooperative arrangement is a ‘working plan’ that is a ‘scheme of operation’ covering control of hunting or preservation of taxa and the maintenance or restoration of habitat. Such plans do not necessarily preclude the continuance of the primary land use activity being undertaken.

Approved ‘working plans’ are binding on the landowner and may require the involvement and participation of Department officers.
While this provides a formal basis for, in effect, the co-management of habitat, its impact is somewhat limited - there are currently no wildlife management co-operative areas in Victoria.

**Declared Critical Habit at Areas**

The Flora and Fauna Guarantee Act 1998 gives the Director-General the authority to determine the habitat of any taxon or community of flora or fauna (whether ’listed’ or not) that is critical to the survival of that taxon or community.  

As noted in Chapter 9, such determination is only of statutory consequence if it relates to a ‘listed’ species or community (or a species or community nominated for listing) and subject to an interim conservation order made by the Minister.

An interim conservation order can prohibit or regulate any activity or process that takes place in that habitat or, if it adversely affects that habitat, any activity that takes place outside that habitat. Landholders or managers of land or water that forms part of that critical habitat are required to comply with that order and the order prevails over planning schemes. While any activity that leads to the modification of habitat is likely to be restricted by such an order, a range of activity may nonetheless continue to be compatible.

There are currently no ‘critical habitat’ areas or areas subject to an ‘interim conservation order’ declared in Victoria. While effectively the interim conservation orders are a mechanism of last resort, the designation of ‘critical habitat’ draws attention to areas of special value and this is of educational value even if not of statutory effect.

**Planning Scheme Controls**

The planning system laid down by the Planning and Environment Act 1987 provides a regulatory mechanism to protect habitat and biodiversity. A biodiversity objective is included in the State Planning Policy Framework:

- to assist the protection and conservation of biodiversity, including native vegetation retention and provision of habitats for native plants and animals.

The implementation guidelines for this objective include the replacement of any vegetation removed as part of a land-use or development proposal, and assisting the conservation of threatened species habitats (as defined under the Flora and Fauna Guarantee Act 1988) and having regard to regional vegetation plans approved under the Catchment and Land Protection Act 1994.

A range of overlay provisions that provide for the protection of habitat may be applied. These include:

a) environmental significance;

b) vegetation protection; and
c) wildlife management.

Such controls rarely inhibit the underlying permitted land use; rather they restrict the clearing of additional habitat.

Most of the generally applied planning scheme zones also include standard provisions relating to the retention of vegetation.

In addition to any local provisions, the removal of native vegetation of an area of more than 0.4 hectares requires a permit, referral to the Secretary (of the Department administering the Flora and Fauna Guarantee Act 1988) and any such approval requires consideration of a comprehensive listing of decision guidelines.\textsuperscript{12}

Other Regulatory Schemes
Other mechanisms available to assist with habitat-retention objectives in Victoria include the Catchment Management Strategies and Regional Vegetation Plans of the various Catchment Management Authorities.

Issues
The statutory mechanisms provided for within Victorian legislation can and do provide for the protection of habitat. While the critical habitat provisions are a powerful tool, it is the planning scheme controls administered by local government that have been applied most often and arguably reasonably successful.

Only one statutory mechanism, the ‘wildlife management co-operative area’ provisions, provides habitat protection through voluntary arrangements - and this mechanism has not been successful in attracting support.

Voluntary Programs

Land for Wildlife
Land for Wildlife is a nature-conservation program that aims to encourage and assist private landowners to provide habitats for wildlife on their properties and integrate the provision of habitat with other uses of the property.

Some 130,000 hectares of habitat are being retained and/or restored under the program, involving approximately 4800 properties.\textsuperscript{13} Approximately 500 new applications are received each year.\textsuperscript{14}

The program is particularly important for habitats that are not well represented on public land - such as box-ironbark woodlands and grasslands. In recent years, to increase the protected area of such habitats, Land for Wildlife Extension Officers have directly approached landowners. As a result, the protected area of these two habitats has increased over the last five years, from 2,700 to 18,000 hectares and 2,500 to 8,000
hectares respectively. This is indicative of a high level of latent community support for such programs.

**Conservation Covenants**
Conservation Covenants under the Trust for Nature program are currently the only mechanism in Victoria for the permanent protection of natural bushland habitat on private land. The covenants are applied under the authority of the Victorian Conservation Act 1972 and form an encumbrance on the title of the property.

To date such covenants protect 8500 hectares of habitat.

**Landcare**
Landcare groups increasingly incorporate the enhancement of biodiversity into their objectives and consequently the protection of remnant habitat or the creation of habitat through shelter-belt and recharge area plantings. Property management planning under the Farm$mart scheme can also lead to enhanced habitat protection.

**Fencing**
Fencing of remnant native vegetation to exclude stock is vital in maintaining and regenerating habitat on private land. There has been significant fencing activity of remnant vegetation in Victoria in recent years by landowners. Such fencing is undertaken on a voluntary basis, with a number of State and Commonwealth programs offering subsidies for such activity.

As at March 1994, approximately 165,000 hectares of native vegetation were protected from stock grazing on private lands.

**Tree Planting**
The planting of trees also provides additional habitat. Australian Bureau of Statistics data indicate that in recent years approximately 7.6 million trees were planted in Victoria. The areas with the largest area of protected native vegetation, that is the Mallee and east Gippsland, have the lowest rate of tree planting.

**Issues**
The use of voluntary schemes appears to be particularly successful in Victoria. Moreover, there appears to be latent support for furthering the application of the available schemes - where participation has been actively sought and targeted (as is evidenced through the experience of the ‘land for wildlife’ and landcare schemes) the participation level is increased.

The most successful schemes appear to be those where there is strong community support or an active advocate. Many of the landcare and fencing programs are not only of biodiversity benefit but have direct productivity benefits to landholders (such as soil-erosion control).
None of the schemes restricts the potential for non-consumptive native flora and fauna utilisation, but would limit options for consumptive utilisation.

**INNOVATIVE INTERSTATE AND NATIONAL PROGRAMS**

**Earth Sanctuaries**

As was noted in Chapter 5, the Committee visited the Warrawong Sanctuary in the Adelaide Hills during its study tour to South Australia and met with a number of directors of the company that runs the property. While the focus of the company is on the protection of small ground-dwelling mammals, especially those that are rare or endangered in their natural habitat, in recent years it has purchased larger properties where the management emphasis includes the maintenance or restoration of the whole habitat of the ecosystem. As was noted in Chapter 5, the company is “committed to saving Australia’s vanishing wildlife … in the wild, together with the whole ecosystem necessary for its survival”.

The company now owns and operates a total of 90,000 hectares. All properties are fenced to provide an environment free of feral animals.

The sanctuaries are financed by a growing number of shareholders in the Earth Sanctuaries company group, in addition to admission and guided-tour fees, sale of souvenirs and other items, and donations. It currently has about 2,500 shareholders, with the most recent prospectus raising some $1.8 million. Its 1998 operating profit was $159,742. The company has four main activities. In summary:

a) it invests in individual Earth Sanctuaries (each sanctuary operates under a separate company structure);

b) it develops sanctuaries by providing services and advice;

c) it manages the subsidiary Earth Sanctuaries; and

d) it runs the tourism business associated with the sanctuaries.

As was noted in Chapter 5, the company is developing an ‘Earth Sanctuary’ in Victoria.

**Australian Bush Heritage Fund**

The Australian Bush Heritage Trust is a comparatively recently initiated program. It is a “national, independent, non-profit organisation committed to the protection of the Australian bush,” and is run by a private non-profit company. It uses public donations to acquire lands that it then manages for nature-conservation purposes.

It currently has land holdings of 1,840 hectares. Although the Trust currently does not own any land in Victoria, it is investigating potential sites for purchase.
Game Management Plans

The game management plan approach has been used in northern Tasmania, where it has successfully addressed a number of problems associated with recreational hunting - illegal hunting, access issues for landowners, and poor pest control results.

Game management plans are also being developed in western NSW in response to increased numbers of large kangaroos, which are regarded by landholders as a threat to their agricultural enterprises. Early in 1999 a community group in NSW, representing eight properties (716,000 hectares) drew up a Property Based Wildlife Management Plan. This provides for individual hunters to contract with landholders for access and hunting rights. In this case the desired species to be hunted are feral pigs and goats. Hunters may remove these animals. At the same time, in return for access to pigs and goats as game, they must shoot kangaroos on a kill-and-let-lie basis, and other feral pests. This arrangement removes reliance by landholders on commercial shooting, which has proved inadequate for population management. Landholders can charge a fee or barter access for pest control in return for access to hunting.

Issues

Of the programs above, the Earth Sanctuary approach is the only program that offers both habitat protection and active utilisation. The Game Management Plans provide an interesting mechanism for joint management of wildlife, but are driven by a requirement for pest control and have no direct habitat protection outcome.

FINANCIAL INCENTIVE PROGRAMS

Rate Rebates

In recent years the use of rate rebates to private landowners who protect bushland areas on their property has been suggested. One such program commenced by the Shire of Wellington offers a rate rebate to private landowners who have a Trust for Nature covenant (see above) on all or part of their land.

Tax Deductibility

The Australian Bush Heritage Fund advocated tax deductibility for all land donated to approved conservation organisations (at the time the federal Income Tax Assessment Act 1936 provided for tax deductibility, but with severe restrictions). The Committee understands that the Federal Government has recently foreshadowed an amendment to this Act to remove those restrictions that have created an impediment to land donation. The Fund also advocates that land donated be available for sale to raise funds for the purchase of other more-valuable land, without losing its tax deductibility status. The Committee notes that this practice, also known as a revolving fund, is available in Victoria under the Victorian Conservation Act 1972, albeit only for those properties donated to the Trust for Nature program.
Issues

Financial incentive schemes are not well developed nor well known or actively advocated.

ZIMBABWEAN CASE STUDIES

Zimbabwe has for a number of years developed a program of involving local communities in wildlife management by way of the transfer of ownership and management responsibilities. This program, the Campfire Program, was identified in the recent Senate Inquiry into the Utilisation of Native Wildlife as a program worthy of further investigation. The Zimbabwe Government has also encouraged the development of privately run and owned conservation and safari parks based on native wildlife, which are now some of the more successful such ventures in the African continent.

The Senate Inquiry into the Commercial Utilisation of Australian Native Wildlife drew attention to the model of sustainable use of wildlife in southern Africa and recommended that:

The government examine the appropriateness of such a model to biodiversity in Australia.\textsuperscript{28}

The Committee took up an opportunity to undertake a study tour to Zimbabwe early in 1999 and investigated the operation of such local management programs. The Committee:

a) met and spoke with the key groups involved in delegated wildlife ownership programs; and

b) inspected rural wildlife programs on the ground and met with local managers and affected communities.

National Context

The Republic of Zimbabwe has a relatively temperate climate with a diverse economy - albeit suffering from a weak currency - and good infrastructure. The country has a population of about 11.5 million, three-quarters of whom live in rural areas. The rural areas have been destabilised in the early 1990s by spillover of conflicts in neighbouring countries. Land supply is limited and there is no social security. In addition to the national government, there are local government areas known as District Councils. About eight national Ministries and 18 statutes cover environmental issues, including the Department of National Parks.

Like a number of developing countries in the region, it has its own conservation approaches and does not support highly restrictive methods. The Zimbabwe Government was pleased that an Australian delegation chose to see the Campfire Program first hand.
Zimbabwe tourism in essence means wildlife. Some 13 per cent of Zimbabwe is in the parks estate, with a further 18 per cent of habitat protected by other government agencies (that is Forests Department), as well as in communal lands and parts of some commercial farms. The Department of National Parks is a large and economically important ministry of government. The Department has had a long-standing sustainable-use focus. It regulates the use of wildlife as well as managing national parks.

In Zimbabwe the wildlife resources are not owned by anyone. However, the owner of land has user rights to wildlife under permit. Currently there is no payment for use (other than permit fee). Three basic permits are granted:

a) hunting permit - to registered commercial wildlife operators, with annual hunting quota (that is 10 animals if population is 100, etc.);
b) selling permit - ie to trade in wildlife; and
c) culling permit - for management purposes.

The highest level of protection is given to endangered species, such as the black rhinoceros. Less-threatened species (those listed in 'Appendix 2' of the Convention on International Trade in Endangered Species of Wild Flora and Fauna (CITES)) can be utilised. These include elephants (which are now basically only found in national parks and nearby land). Elephant quotas are set by national aerial surveys. There is no hunting permitted in national parks - other than required culling. Culling is undertaken by sub-contractors, with all byproducts utilised. Hunting-only ‘safari areas’ have been established. Hunting is also permitted on private game ranches and communal lands.

The World Conservation Union (IUCN), a United Nations conservation program, operates a regional office from Harare, Zimbabwe. It oversees a number of programs, including wildlife export programs (as part of the implementation of CITES) agreements for endangered species).

The CAMPFIRE Program

The Committee met with the Director and other staff of the CAMPFIRE program in Harare and also discussed the program on the ground and inspected local community activities in the Chiredzi and Chipinge Rural Districts.

Overview of the Concept and Operation

The primary goal of the CAMPFIRE Association is ‘to see rural communities in Zimbabwe freed from the vagaries of poverty and enjoying the benefits of the sustainable use of their natural resources’. Its approach is ecosystem based, not species based. It sees sustainable use as desirable from a conservation as well as economic perspective.
In 1975 the National Parks and Wildlife Act permitted farmers (that is mainly white settlers) to gain benefit from the wildlife on their land. As a result, wildlife numbers went up, or more specifically, the numbers of wildlife of high tourist or game value went up. Examples of the application of these legislative provisions are the Malilangwe Trust and Save Conservancy described below.

In the early 1980s the Act was amended again to allow similar provisions for communal land - the ‘Communal Areas Management Programme’. This enabled local authorities (the District Councils) to manage the wildlife on the communal lands (that is the lands of the indigenous Zimbabwe people) on behalf of the local people.

The Act provided for licences for the use of the natural resources of these areas - mainly for hunting and to a less, but increasing, extent, ecotourism (and more recently forestry and mining). In essence the CAMPFIRE Program is about sustainable utilisation and devolvement of natural-resource management to local communities.

The program works through the Rural District Councils (that is local government), although there is also a national coordinating body - the CAMPFIRE Association. This was set up in 1989 to represent and promote the rural communities involved in the CAMPFIRE program. The Association is a non-government organisation (NGO) and is largely funded by donor countries (including Australia). Some 36 District Councils have chosen to join the program to date.

Each District Council has a CAMPFIRE Committee, with individual local communities (wards) choosing whether or not to be part of the program. In turn the local communities elect a local committee to oversee the program in their area. The district programs were kick-started by international donations.

To date the emphasis has been on hunting rights. Consequently most of the programs in operation are in areas adjoining national parks, where the highest concentrations of wildlife remain. Only animals outside the national parks can be taken. Quotas are set by the National Parks Department (the ‘wildlife experts’), with the CAMPFIRE Program acting as ‘service provider’. There is often tension between the scientifically based quota and the quota desired by the local authorities - but the advice is adhered to and may be negotiated.

Pre-1982 poaching was rife and elephants used to trample villages’ crops. Using force against local communities didn’t work to preserve illegal kill of elephants (note that a number of the national parks were formerly communal lands). CAMPFIRE responded to this in an innovative way. There are now 66,000 elephants in Zimbabwe (scientifically based carrying capacity has been estimated as 35,000) and the growth rate is now five per cent per annum.
Hunting can only be undertaken by licensed professional hunters, who pay both an access right and a trophy fee to the CAMPFIRE Program. The District Councils and National Parks monitor the hunters’ operations and armed ‘game monitors’ are employed as anti-poaching units.

Any revenue is split between the CAMPFIRE Association head office (two per cent), the District Council (generally around 15 per cent - some, however, take up to 50 per cent), and the local communities (generally around 75 per cent).

**Community Benefits**

The District and Local Committees decide the allocation of revenue. The local committee may decide to allocate the revenue to, most commonly, a community use such as a clinic or school and/or distribute it as a dividend to the head of each household community. Other benefits of the program are the development of leadership, self-confidence and an increase in political awareness among local communities.

The program is attractive to local communities - CAMPFIRE income may provide up to 80 per cent of a household’s annual income ($US10 is the average per annum income in these areas). In the Chiredzi District Council area, 11 wards have chosen to be part of the program (all about national parks). One of these, the Chehondo Ward program, was visited by the Committee.

The benefits of the program were most impressive. Here was a community that was economically destitute by any account (and had experienced major dislocation from the Mozambique war) but had dignity, a vision for the future and accountable and democratic processes. The development of basic infrastructure (such as a store, a mill and water bore) was the outward tangible benefit of the program. The bore is intended not only to ease domestic life, but will enable the production of cash crops such as citrus fruits and vegetables (the community would also be pleased to receive financial assistance to purchase a truck to help this project!).

While the District CAMPFIRE Committee/District Council puts the hunting concessions out to tender, separate hunting areas are defined - which define the return to the local community. Last year eight elephants were killed on Chiredzi lands – for which the community received $US1,000 per person. The local people are protective of the elephants and actively ensure that there is no poaching and that local by-laws (such as tree-clearing restrictions) are obeyed.

The Committee also visited a local program in the Chipinge Rural District Council area - the Mahenye Ward program.

This program also had the very enthusiastic support of the local village community. The CAMPFIRE program had funded telephone systems, electricity, a clinic and road
construction. One innovation was the construction of a ‘tourist village’ from CAMPFIRE funds to display traditional architecture and living styles. A sanctuary area is proposed on communal lands and a zebra meat processing plant is being considered.

A key and pioneering project in the Mahenye Ward was the partnership created between the community and a lodge developer (Zimbabwe Sun Ltd). Under the arrangement the company was given to build two lodges on community lands, with a share of revenue returned to the community.

**Independent Appraisal of the Program**
The Wildlife Society of Zimbabwe, a long-standing community-based conservation organisation, supports the CAMPFIRE program and the work of the ‘Wildlife Producers Association’ (private landowners/conservancies with ‘ownership’ rights to the wildlife on their properties). Such support was conditional on the existence of the current system of regulations and permits. It believes that CAMPFIRE has prevented poaching and encouraged local communities to protect habitat. The Society also undertakes environmental education through the creation of small sanctuaries near population centres. It owns and operates these sanctuaries, which are stocked with native wildlife.

Environment 2000, a grass-roots organisation established in 1990, has a contrary view. It considers that the CAMPFIRE program was hijacked by the Government and is now led by District Councils rather than the originally envisaged local communities. Revenue generated seems to be used to fund infrastructure, a responsibility previously the sole province of the District Councils.

An indication of the program’s success is the establishment of similar programs in neighbouring countries.

**Conservation Trust Properties - the Malilangwe Conservation Trust**
The Committee visited the Malilangwe Conservation Trust property and spoke to its Executive Director, Mr Derek de la Harpe.

The Malilangwe Conservation Trust is a non-profit body that bought a run down farm that retained much of its original habitat but little wildlife. Over five years it restocked the land and it is now managed as a private conservation/ecotourism park. The property is fenced and patrolled. It has developed two up-market tourist lodges on the property.

The Trust is locally run, but funded largely through a European charitable organisation. It aims to be financially sustainable and sees itself as a model, not only for conservation, but also for development. The Trust also makes a point of assisting
adjoining landowners/communities through a ‘Neighbourhood Outreach Program’ of skill transfer and local employment.

It has spent $US1.5 million on restocking animals (although predators such as lions reappeared naturally from surrounding areas. More recently it has acquired 28 black rhino for $US1 million from South Africa. (This was the biggest private wildlife transaction - and involved the purchase of 10 per cent of the total rhino population). Animals were purchased from national parks and private landowners. Trading is only permitted within the country - export is not permitted.30

Breeding has been successful and the Trust is planning to sell zebra and envisage that in three to five years it will have to cull elephants. The ability to sell surplus stock is an important funding source.

It permits game shooting, but only if the whole park is closed - that is it separates hunters from ecotourists in time and space. Hunters have to be accompanied by a licensed professional hunter. Landholders can authorise the killing of animals on their land. Trophy hunting is largely self-regulating because of the need for ‘trophy standard’ animals to sustain an ongoing industry.

Wildlife is now considered more valuable than cattle ranching in drier parts of the country. Any culling has full recovery of hides, tusks, etc. It costs $Z2,400 to kill an elephant, but (with recent easing of CITES rules) the Trust can sell elephant products - $Z11,000 can be obtained for a hide.

Nature Conservancies - the Save Conservancy

The Committee visited the Save Conservancy property and spoke to the Director, Mr Clive Stockil, and other Board members. It is the largest of a number of similar conservancies in Zimbabwe.

The conservancy is located in a low-rainfall area. When the area was settled in the 1920s, wildlife had no value, with cattle the only economic activity. However, the land was marginal, and so stocking rates were increased even though it was obvious that this degraded the land. Recent research has shown that perennial grasses declined (further reducing carrying capacity) and that native animals were out-competed (as selective eaters) and indeed were shot out.

The 1991-92 drought was the ‘cross roads’ for this part of Zimbabwe - the ecosystem effectively collapsed.

A group of (white settler) landowners engaged Price Waterhouse to undertake an investigation into alternative productive and sustainable uses for the land. In effect the report concluded that running wildlife best met the three required criteria of environmental sustainability, economic viability and socio-political acceptability.31
Two key strategies were used - a conservancy and a trust. The Government provides a framework of rules and regulations under which it operates.

The conservancy consists of 21 individuals who own their own freehold - covering 900,000 acres. They all generally operate their own areas - but the wildlife roams over all.

The initial focus was on restocking and fencing - a double fence (to prevent buffalo mixing with adjoining cattle as a quarantine requirement) surrounds the conservancy. Research was undertaken into species, stocking rates, reproduction, etc. and a central research facility established. Elephants were bought from the Government - at the cost of the otherwise required cull. It shifts elephants in family groups which, while more expensive, avoids death from stress and it has found that re-establishing family groups avoids problems associated with the previous practice of only troublesome males being available. Specimens of the endangered black rhinoceros have also been purchased. Numbers of these are increasing 10 per cent per annum.

The Trust is for local communities in the district to become involved by obtaining wildlife and entering into management agreements with the conservancy to carry and breed the wildlife. Any offspring are returned to the Trust, who can sell them. This has helped obtain community support and overcome poaching. It was kick-started by a $2 million donation by the Conservancy.

Most of the landowners operate various kinds of ecotourist activity, such as tourist lodges and wildlife viewing; some permit hunting safaris. Revenue is also obtained by trading animals.

It is not quite economically self-sustaining at present. The Board has found that balancing the stocking of economically attractive animals with ecologically appropriate animals is difficult - it tries to work on the basis that nature knows best.

**Issues**

The CAMPFIRE program is targeted at communities that have joint ownership of extensive areas of communal lands. Such a circumstance is rare in Victoria (although, the Committee notes, may be applicable elsewhere in Australia). However, the advantages of ensuring that local communities gain a direct benefit from nurturing their native wildlife was well demonstrated. The Committee also noted that the wildlife being harvested did not solely reside within the bounds of the communal lands - the territories of the wildlife included, but were not restricted to, these lands. The wildlife being protected were mostly dependent on the maintenance of habitat in adjoining lands (which was included in national parks).
The conservation trust and conservancy models rely on the ability of private landowners to trade in animals - to stock the areas and to generate income. The entire territory of the fauna is within the boundary of the relevant trust or conservancy.

2 ibid., p. 83.
4 Wildlife Regulations 1992, r. 9.
5 Wildlife Act 1975, s. 32.
6 Wildlife Act 1975, s. 32.
7 Flora and Fauna Guarantee Act 1988, s. 20.
9 Flora and Fauna Guarantee Act 1988, s. 27(b) & (c).
10 Flora and Fauna Guarantee Act 1988, s. 36 – failure to comply with any notice of prohibition or compliance with result in an initial 100 unit fine and further 10 unit per day penalties.
13 Department of Natural Resources and Environment, Properties by Year Assessed Data Base - as at 01 June 1999.
16 Although the actual incentive to fence may be to restore balanced water recharge.
17 As shown by data collected by the Australian Bureau of Statistics in recent years.
18 Department of Natural Resources and Environment (1997), Know Your Catchments, Victoria 1997. An Assessment of Catchment Condition Using Interim Indicators, Department of Natural Resources and Environment, Melbourne, Vic., pp. 82, 88.
19 Even if undertaken primarily for aesthetics, shade and shelter, land-degradation control or capital gain.
23 ibid.
24 Letter from the Minister for Conservation and Land Management to Earth Sanctuaries Limited; 1 December 1998
26 ibid.
27 ibid.
29 This may change in the future.
30 It seems that these restrictions relate in part to previously exported animals being used for ‘canned lion hunting’ in South Africa.
31 Some have argued that it also provides a mechanism to avoid government land redistribution policies.
CHAPTER 11
CONCLUSIONS AND RECOMMENDATIONS

• **INTRODUCTION**

• **GENERAL FINDINGS AND RECOMMENDATIONS**

• **BEST PRACTISE PRINCIPLES AND SECTOR-SPECIFIC RECOMMENDATIONS**

• **FACILITATION OF UTILISATION PRIORITIES - KNOWLEDGE AND RESEARCH**

• **RESOURCING**

**INTRODUCTION**

The Committee was asked to undertake an inquiry into the utilisation of Victorian native flora and fauna and, in particular (in summary):

a) identify the potential for utilisation of Victorian flora and fauna;

b) assess the economic and environmental sustainability of that potential; and

c) examine and report on the existing statutory and other controls on the utilisation of native flora and fauna.

The Committee was required to report within a framework of ecologically sustainable use.

In line with current international and national policy, the Committee has considered and developed a framework of Ecologically Sustainable Development (ESD) - this is outlined in Part A of this report (Chapter 2). This framework provided a useful reference point for the collection and assessment of information on current and potential utilisation and has been used to assist the Committee in formulating the recommendations outlined in this chapter. The Committee discusses methods to further the use of this framework of ESD at the end of the chapter.

In Part B of the report (Chapters 3 to 6), the Committee identified current forms of utilisation of native flora and fauna in Victoria, identified the potential of such existing activity and the potential for additional forms of utilisation.

Economic, environmental and regulatory issues are touched on in Parts A and B of the report, but further elaborated upon in Part C (Chapters 7 to 10).

Part D, consisting of this chapter and the following chapter, presents the Committee’s conclusions and recommendations. It draws on Parts A, B and C as well as on the issues and Senate Inquiry summary outlined in the Discussion Paper and builds on the
responses to the questions raised in the Discussion Paper received in written submissions. The Committee has ensured that all its recommendations are consistent with ESD principles and are, in its opinion, reasonable and able to be implemented.

GENERAL FINDINGS AND RECOMMENDATIONS

The Committee has found that there is a variety of utilisations of native flora and fauna legally permitted and occurring in Victoria.

Indeed, in undertaking its research for the Inquiry, the Committee was surprised at the extent and variety of utilisation activity already being undertaken. Much of this activity is at a developmental stage and the Committee was impressed with the motivation and efforts of the individuals pioneering the various sectors. The activities being undertaken are as diverse as the species being used.

It soon became apparent to the Committee that it was not possible, nor indeed desirable, to attempt to solve all the issues facing each sector within the restrictions of the current Inquiry, nor to make detailed recommendations for individual taxa. It has not done so.

The Committee has, however, attempted to draw together some general conclusions and recommend approaches that it believes will be of general applicability - not only responding to current issues and the problems presently facing sectors, but providing a framework that will be applicable to the issues of tomorrow.

Despite the complexity of activity, the Committee found that there were recurring themes and issues across what, at first, seemed disparate sectors. Moreover, it seems that many sectors face similar issues as they develop. Such similarities occur, irrespective of whether the utilisation is commercial or non-commercial in nature. While plant and animal sectors are often subject to quite different regulatory regimes and evoke different emotional responses, the Committee believes that for many issues there is great similarity and differentiation is unnecessary.

The Committee has observed that most sectors of consumptive use, irrespective of the species involved (or indeed whether the species is an animal or a plant), appear to pass through four main ‘phases’ of development. Some sectors may encompass more than one phase at a time. These four phases are:

a) wild harvest;
b) ranching and/or transitional (that is, activity that is still using, but not reliant on wild harvest);
c) basic cultivation or farming (including selective breeding); and
d) ‘high tech’ and/or genetic engineering-based production.
Those industries involved in the processing of the resultant products of such consumptive use face issues which are similar, irrespective of the particular sector and of the actual taxa, or indeed product, being produced.

There appear to be two key sorts of non-consumptive activity, each facing a different set of issues, again irrespective of the taxa being targeted. These are:

a) activity reliant on wild populations (which may be facility-dependent, such as the penguin parade, or non-facility-dependent such as nature-study activity); and

b) activity reliant on captive populations (such as aviculture).

In addition, the Committee acknowledges and recognises the need for additional requirements across all of these groups of activity to reflect the welfare needs of vertebrate animals.

In summary, the Committee believes that from a natural resource perspective utilisation can be usefully grouped into the following forms of utilisation - irrespective of the species involved:

a) consumptive uses
   i) wild harvest
   ii) ranching/ transitional
   iii) basic farming/ cultivation
   iv) high tech/ genetically engineered

b) processing of plant and animal product

c) non-consumptive uses
   i) activity reliant on wild populations
   ii) activity reliant on captive populations.

The permits, legislative controls, access and property rights, research and marketing needs, monitoring and reporting requirements are likely to be similar for each of these sector groupings - and dissimilar between groupings. The notable exception is additional requirements that address vertebrate-animal welfare issues.

These groupings are not necessarily comprehensive, but have been used by the Committee to assist in its assessment of utilisation activity from an ESD perspective.

**Recommendation 1**
That the planning and regulation of utilisation generally be consistent within each of the following:

a) consumptive uses
   i) wild harvest
   ii) ranching/ transitional
   iii) basic farming/ cultivation
   iv) high tech/ genetic engineered

b) processing of plant and animal product
c) non-consumptive uses
   i) activity reliant on wild populations
   ii) activity reliant on captive populations.

An ESD Assessment of Utilisation

The Committee believes that the best form of utilisation is one that most fully meets the three ESD objectives.

These objectives are very broad and it is appropriate to interpret and clarify them in the context of the desired utilisation objectives.¹ The Committee believes that it is appropriate to give special emphasis to:
   a) activities that would build on existing industry sectors;
   b) activities that offer a broadening of the income base of struggling rural businesses - relating to the ESD objective of well-being of the individual and community;
   c) activities that offer high flexibility of wild population use for the future (and least risk of adverse impact) - relating to the ESD objective of intra- and inter-generational equity;
   d) activities that form part of a population-control program undertaken for conservation purposes - relating to the ESD objective of biodiversity and ecological processes;
   e) activities that involve a clear incentive to protect species and habitat - relating to the ESD objective of biodiversity and ecological processes; and
   f) activities that make use of native species that are suited to (evolved with) local conditions - relating to the ESD objective of biodiversity and ecological processes.

With these areas of special emphasis in mind, together with an awareness of all the material obtained as part of the Inquiry, the Committee undertook an assessment of the various groupings of utilisation activity. A summary of the Committee’s assessment is included in Table 11.1. While it is not a matter of passing or failing ESD, and there are clearly areas of degree, in the Committee’s opinion some sectors are more ready than others to respond to the principles espoused in the ESD concept.

As outlined in Chapter 2, the Committee developed a series of questions (the ‘Question Set’) as part of its ESD Framework - to assist in its assessment of the various utilisation sectors.
### Table 11.1 An ESD-based assessment of utilisation-sector groupings

Note that these are NOT recommendations.

<table>
<thead>
<tr>
<th>ESD question:</th>
<th>The nature of utilisation</th>
<th>ESD - well-being of the individual and community</th>
<th>ESD – equity</th>
<th>Part of population-control program for conservation</th>
<th>Incentive to protect species and habitat</th>
<th>ESD - biodiversity and ecological processes</th>
<th>Native species suited to local conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Key requirement:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wild-harvest of plants.</td>
<td>Limited</td>
<td>Limited - potentially expand</td>
<td>No</td>
<td>Limited</td>
<td>Limited</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>Ranching/transition use of wild plants</td>
<td>Limited (tree ferns)</td>
<td>Limited - potentially expand</td>
<td>No, but potentially</td>
<td>Limited</td>
<td>Ranching - yes. Transitional – limited</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>Cultivation of plants</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes - no direct impact</td>
<td>No</td>
<td>Limited</td>
<td>Yes, but genetic drift</td>
<td></td>
</tr>
<tr>
<td>High tech breeding/cultivation of plants.</td>
<td>Nil</td>
<td>Unlikely</td>
<td>No - but potentially</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>Processing of plant material</td>
<td>Yes, but limited</td>
<td>Yes</td>
<td>Yes - depending on source</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>Wild-harvest of animals</td>
<td>Yes, fisheries only. Other species elsewhere</td>
<td>Limited – commercial fishery only. Potential for other species</td>
<td>No</td>
<td>Limited</td>
<td>Potentially limited</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>Ranching/transitional use of animals</td>
<td>Limited</td>
<td>Limited – potentially expand</td>
<td>No, but potentially</td>
<td>No (collection of eggs possibly).</td>
<td>Limited</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>Farming of animals</td>
<td>Yes, aquaculture and emu only</td>
<td>Limited - potentially expand</td>
<td>Yes - no direct impact</td>
<td>No</td>
<td>Potentially</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>High tech breeding/farming of animals</td>
<td>No</td>
<td>No</td>
<td>Yes - no direct impact.</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>Wild-harvest of microbiota</td>
<td>Limited, pharmaceutical screening</td>
<td>Limited</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>N/a</td>
<td></td>
</tr>
<tr>
<td>High tech production of microbiota</td>
<td>No</td>
<td>No - but potentially high whole-community benefit</td>
<td>No, but potentially</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>Processing of animal material.</td>
<td>Yes - emu, kangaroo, fish</td>
<td>Yes - but localised</td>
<td>Yes - depending on source</td>
<td>No - but potentially</td>
<td>Limited</td>
<td>N/a</td>
<td></td>
</tr>
<tr>
<td>Ecotourism/rec - wild, no facilities</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes - no direct impact</td>
<td>N/a</td>
<td>Yes</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>Ecotourism/rec - captive, no facilities</td>
<td>Yes – aviculture, herpetology, pets</td>
<td>Limited</td>
<td>Yes - no direct impact</td>
<td>Limited</td>
<td>Limited</td>
<td>Limited</td>
<td></td>
</tr>
<tr>
<td>Ecotourism – wild resource, facilities</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes - depending on facility</td>
<td>N/a</td>
<td>Yes</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>Ecotourism – captive resource, facilities</td>
<td>Yes</td>
<td>Yes</td>
<td>No - but potentially</td>
<td>N/a</td>
<td>Limited</td>
<td>Limited</td>
<td></td>
</tr>
<tr>
<td>No active utilisation</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td></td>
</tr>
</tbody>
</table>
**Well-being of the Individual and Community**
The Committee noted that sectors involved in the cultivation and processing of plants, the processing of animal products and ecotourism presently offered the greatest opportunity to broaden the income base of rural businesses. Some other sectors currently do not contribute greatly but have the potential to expand their contribution. The high-tech production of microbiota, in particular, is considered to offer high potential for whole-of-community benefit.

**Equity**
The Committee considered that a key equity issue was the level of flexibility of wild-population use for future needs. Sectors not involved in the consumptive use of wild populations were considered to offer a higher level of flexibility than those involved in direct consumptive use. Some sectors offered a high level of flexibility, but may have indirect impacts.

**Biodiversity and Ecological Processes**
The Committee noted that few sectors, and then only to a limited extent, contributed to population-control programs for conservation purposes. Few sectors also were assessed as proving an incentive to protect species and habitat - for instance wild-harvesting to a limited extent; ecotourism activity based on wild resources was considered to provide the most incentive. The use of native species suited to local conditions was a biodiversity and ecological-process benefit offered by many, but not all, utilisation sectors.

**In Conclusion**
The Committee considers that the forms of utilisation which most readily meet all three ESD objectives are:
- a) cultivation of plants;
- b) farming of animals - especially aquaculture;
- c) ecotourism/recreation - based on wild resource (whether reliant on facilities or not).

**Consequent Priorities**
While the Committee does not believe that it is necessarily appropriate to prohibit any particular form of activity, it does consider it desirable to provide guidance as to the relative priority of the various forms of utilisation activity. Such prioritisation should assist in the allocation of resources and in making decisions regarding alternative forms of land use.
Recommendation 2
The Committee rejects the notion of ‘no active utilisation’ and recommends that the Government:

a) encourage ecotourism/recreation activity based on wild resources, including those forms that are facility-dependent;
b) encourage cultivation of native plants;
c) encourage aquaculture of native species;
d) provide the opportunity for the farming of other species of animal whose welfare needs can be met;
e) permit ‘ranching’ and, in special circumstances, wild harvest - to the extent needed to establish cultivation or farming;
f) permit ecotourism/recreation activity based on captive resources;
g) permit ‘high tech’ production techniques, especially of microbiota; and
h) avoid wild-harvest of plants and animals - unless special circumstances exist.

The Committee believes that all use that is consumptive of wild populations should be subject to some form of management regime and active regulation. The Committee notes that currently applicable legislation provides for this in a variety of ways. In some instances there is no overt basis provided for utilisation.

Recommendation 3
That all consumptive use of native species be subject to an active management regime and to regulation.

For some taxa a management regime only comes into place if problems have arisen or an operator seeks surety of operation or supply. Such regimes may be ad hoc and unnecessarily of greater imposition to some sectors than others; being based on tenure or the particular species being targeted, rather than the actual potential impact of use.

The Committee believes that the utilisation of all species should be subject to management regimes and regulatory controls that are consistent, generally applicable and proactive.

To ensure that all species are brought under the umbrella of proactive regulation, the Committee considers that the approach adopted in the current Wildlife Act 1975, by which all species are protected, with provision made for consumptive use under authorisation, should be made generally applicable. The Committee also believes that provision should be made for general exemptions for classes of activity that are currently permitted and subject to other specialist legislation or control.
## Recommendation 4

4.1 That all native species be protected from commercial consumptive use, with provision made for consumptive use under authorisation and to provide for general exemptions for defined classes of activity for species not ‘listed’ under the Flora and Fauna Guarantee Act.

4.2 That generally exempt classes of activity should be subject to regular review and initially consist of:

- a) plants used for timber production;
- b) fish subject to a fishery plan under the Fisheries Act 1998;
- c) plants and invertebrates affected by agricultural production;
- d) native water birds declared as ‘game’ under the Wildlife Act 1975; and
- e) developments in accord with a planning approval under the Planning and Environment Act 1987.

(Such exempt activities would still be subject to meeting other existing statutory controls, including codes of practice and the Flora and Fauna Guarantee Act 1988).

Existing legislation does not always provide clear objectives for utilisation activity, nor criteria for the definition of regulations or application of discretion for licences, permits or authorities. ESD does not dictate how native flora and fauna should be used - but provides principles to guide such use. In the Committee’s opinion the ESD objectives should be an integral part of any provision relating to utilisation, and at the very least a clear objective of biological diversity and ecological process maintenance should be included.

Where objectives are currently in place, there is little requirement for a monitoring of outcomes to ensure that objectives are met. As part of its ‘ESD Framework’, the Committee has prepared a ‘Management System’ that advocates the use of a monitoring–reassessment feedback process. ESD is based on an assumption of dynamic processes.

The Industry Commission (now Productivity Commission) has proposed, in its report of its Inquiry into Ecologically Sustainable Land Management, that a statutory duty of care requiring all those involved in natural resource management to ‘take all reasonable and practical steps to prevent harm to the environment that could have been reasonably foreseen’. It is envisaged that such a duty of care will foster a proactive approach by those responsible for natural-resource management and provide a starting point for regulation.
Recommendation 5

5.1 That all regulatory control relating to consumptive use be transparent, with clear goals stated; with legislation to include ESD objectives. A statutory ‘duty of care’ should be defined for all relevant agencies involved in administering such regulatory controls. It should reflect a ‘precautionary principle’ approach.

5.2 That all regulatory controls of utilisation incorporate the key elements of the Committee’s ESD Management System, viz:
   a) initial assessment;
   b) plans based on assessment;
   c) implementation and monitoring;
   d) regular review; and
   e) reassessment and improvement.

5.3 That all regulatory controls be based on authoritative research and be subject to regular review and community consultation.

As noted above, the level of current regulatory control may be not necessarily be related to the sensitivity of the taxa involved. As noted in Chapter 9, the level of control and limitation on the nature of utilisation of some species is greater than that of other species ‘listed’ as threatened with extinction. Discretion on permits is not necessarily based on clear criteria, and the level of discretion is not necessarily related to the sensitivity of use. Consideration of the welfare of individual animals should be clearly distinct from such consideration of the total population.

Recommendation 6

That regulatory controls take a ‘risk management’ approach - that is be commensurate with the potential effect of utilisation to diminish adverse outcomes in terms of the ESD objectives. In particular, that:
   a) utilisation of all ‘listed’ threatened taxa (as listed under the Flora and Fauna Guarantee Act 1988) be subject to the highest level of regulation and protection;
   b) criteria for the granting of permits and conditions be defined and clear and relate to the attainment of ESD outcomes;
   c) welfare issues affecting individual sentient species be clearly and separately dealt with;
   d) all licences, permits and authorities for use be subject to mandatory adherence to any relevant codes of practice, with penalty provisions (including voiding licences) prescribed for non-adherence;
   e) translocation of species to catchments (aquatic species) or regions outside the natural distribution of the wild population only occur after potential impacts are assessed and procedures put into place to minimise harmful effects,
including the introduction of pathogens and to ensure the maintenance of indigenous genetic stock.

Utilisation activity may face regulation under the Wildlife Act 1975 and/or the Flora and Fauna Guarantee Act 1988, the need for planning permits under the Planning and Environment Act 1987, as well as requirements under local government by-law control.

The Committee believes that all such controls should deal with clearly separate issues or be integrated. It notes that the main issues dealt with by regulatory controls are:

- a) planning issues - related to the suitability of a particular area for the carrying out of utilisation activity; typically these issues relate to scale and amenity;
- b) access to land - provision to give legal right to occupy Crown land in particular;
- c) technical issues - related to the meeting of technical standards, including animal welfare standards, the competency of the operator and, to ensure that there is no adverse impact on the wild population, the meeting of biodiversity objectives.

**Recommendation 7**

7.1 That the use of land for any activity involving the utilisation of native flora and fauna be subject to the normal planning processes of the Environment and Planning Act 1987 and the associated planning scheme requirements; and that there be no special requirements because native species are being used other than a cross-reference requirement to meet any technical approvals.

7.2 That leases and licences to use Crown lands for utilisation activity not deal with planning issues or technical competencies other than by cross-reference to planning schemes or the requirement to meet any technical controls.

7.3 That special regulatory controls for use of native species be limited to the meeting of technical issues.

7.4 That consideration be given to combining the Wildlife Act 1975 with the Flora and Fauna Guarantee Act 1988, with a view to incorporating all technical requirements for utilisation activity into the one piece of legislation.

The Committee considers that the key technical issues that need to be dealt with by regulatory control mechanism are those relating to:

- a) the meeting of biodiversity objectives - notably to ensure that there is no adverse impact on the wild population; and
- b) animal welfare standards - including health and well being as well as cruelty.
The Committee understands that many of the current licensing provisions arise from the perceived need to create a ‘paper trail’ to provide proof that biota have been bred from captive stock or obtained legally from the wild. The Committee notes, however, that the creating of a paper trail by way of licence is only one of a number of ways to provide proof of source. It notes that domestic cats and dogs can be identified through use of microchip technology, that DNA testing can be used to verify parentage, tagging systems can also enable tracking (as used for selected plant species), or use can be made of notices of purchase and disposal (as per motor registration systems).

The current wildlife licensing system in particular appears to be overly complex and administratively onerous for reasons that are not obvious to the Committee. Licensed use of biota is encompassed by three Acts, with the provisions for flora and fauna (other than fish) having similar objectives but are under two completely separate Acts. It is noted that for many species that are readily available from propagated or captivity-bred sources there is no incentive to obtain specimens from the wild, and in any case such biota are generally common in the wild.

The Committee considers that the key principles of any technical requirements are:

a) consistency across sectors;
b) ease of understanding;
c) based on obvious benefits; and
d) reciprocal rights and consistency between States (as populations of native flora and fauna are often not State-specific).

**Recommendation 8**

8.1 That the licensing of the use of native biota be considerably simplified and, in particular, that the licensing provisions of the *Wildlife Act 1975* and *Flora and Fauna Guarantee Act 1988* be reviewed with a view to creating a simpler system including the following elements:

a) a competency-based system of licensing of operators to:
   i) privately keep and breed species rare in the wild (for example ‘listed’ species) and species difficult to keep;
   ii) wild-harvest or control (irrespective of whether commercial or not);
   iii) undertake commercial activity - possibly with individual sectors subject to sector-specific endorsement;

b) tracking systems for individual biota - to be based on the most appropriate form for each taxa - variously nil, book registers, notice of purchase/sale, use of microchip, DNA sampling and so forth - by species or group of species on the basis of risk to biodiversity and ecological process;

c) registering of commercial premises (not necessarily under the *Wildlife Act 1975*, but accessible to wildlife inspectors).
8.2 That species which are essentially domesticated, with large captive or cultivated breeding stock and limited potential for environmental hazard, be treated in a similar manner to other non-native domesticated plants and animals.

8.3 That all licences be subject to meeting codes of practice and other technical standards (and proof of competency) in addition to the current ‘fit and proper person’ requirements; and that encouragement be given for operators to seek accreditation with sector-based quality-control programs or to implement the Committee’s suggested Management Framework.

BEST PRACTICE PRINCIPLES AND SECTOR-SPECIFIC RECOMMENDATIONS

The Committee has considered in detail the facilitation of three selected sectors - the cultivation of native plants (horticulture and nursery sectors), ecotourism and aquaculture. Its conclusions are described in Chapter 12.

More generally, the Committee considers that it is appropriate for the extent and nature of facilitation to respond to the sector’s stage of development. Accordingly it recommends the following general forms of support.

**Recommendation 9**

That facilitation of priority sectors (being cultivation of native plants - horticulture and nursery sectors, ecotourism and aquaculture) be based on the following principles for each of the following three stages of industry development:

a) exploratory (that is the ‘good idea’ stage) - support through targeted research on basic biological needs and characteristics and potential environmental impacts and markets - with industry;

b) developing - support through targeted research on production techniques - with industry and clear regulatory controls; and

c) mature - assist with clear regulatory controls.

For most sectors, export markets are an important, if not vital, component of ensuring the viability of utilisation activity.

**Recommendation 10**

That Victorian management systems for the priority sectors of cultivation of native plants (horticulture and nursery sectors) and aquaculture be of a quality suitable for Commonwealth export requirements and that such export accreditation be sought.
As noted in Chapter 9, the basis for granting access to the genetic resources of Australian native flora and fauna is ill defined and inconsistent across the States. Exclusive access to particular biological resources of some States is being granted for species that are not exclusive to that State. The regulatory mechanism to implement a consistent approach could occur through a centralised ‘single desk’ system.

Relevant codes of practice, licensing provisions and the range of species that may be taken or kept vary between States. In Victoria, import-export permits are required to provide the opportunity for checking that each State’s requirements are being met by individuals.

**Recommendation 11**

11.1 That national strategies be developed to ensure a consistent approach to the granting of access rights to the genetic material of Australian native species, and to this end, the Victorian Government actively pursue a common approach through the Australian New Zealand Environment and Conservation Council and other appropriate joint ministerial councils.

11.2 That the Victorian Government develop bilateral/multilateral agreements relating to the use of the State’s natural flora and fauna resources, in accordance with national strategies.

11.3 That the Victorian Government support and pursue consistency of codes of practice and regulations in the relevant national forums and explore mutual accreditation of the regulatory controls of other States.

**Encouragement of Ecotourism/Recreation Activity Based on Wild Resources, Including Those Forms That Are Facility-dependent**

**Recommendation 12**

That ecotourism and recreational activity be undertaken in accordance with the following principles:

a) the level of human activity be within the carrying capacity of the natural resource;

b) preference be given to education-focused activity;

c) the siting and scale of facilities should not adversely impact on the natural resources;

d) access rights involve a contribution to the maintenance of the resource.
Recommendation 13
13.1 That ‘conservation of habitat’ be considered as a legitimate form of land use or ‘business’ - and that tax concessions for its management be pursued.

13.2 That the State Government encourage local municipalities to promote rate rebates for lands subject to Trust for Nature covenants or registered with the Land for Wildlife or similar schemes.

Recommendation 14
That where an ecotourism or recreation business operates from a private property that encompasses, or in conjunction with adjoining property under formal co-management arrangement encompasses, the entire ‘home territory’ of the wild population of a species, provision may be made by way of licence or permit for the trading of species to stock the property or to dispose of surplus animals.

Encourage Cultivation of Native Plants

Recommendation 15
That cultivation of native plants, and in particular the floriculture and horticulture/nursery sectors be undertaken in accordance with the following principles:

a) activity be on land previously cleared;

b) propagation practices avoid genetic pollution (the use of sterile cultivars should be pursued in particularly sensitive areas);

c) where relevant, form part of a diversified operation (and ideally meet other objectives, such as soil-erosion control and shelter belts).

Recommendation 16
That locally indigenous plants be actively promoted in extension programs for use in saline planting, recharge-area plantings and soil-erosion control programs, and be made a condition of government grant programs.

Currently there is legislative provision for the legal ownership of timber-producing trees to be separated from the ownership of the property on which they grow.

Recommendation 17
That legislative provision be made for the separation of the ownership of all plants from the ownership of the land - especially to facilitate plantations of slow-growing species and varieties.
Encourage Aquaculture of Native Species

Recommendation 18

That aquaculture be undertaken in accordance with the following principles:

a) activity be undertaken in closed systems - with no release of wild specimens;

b) material for stocking of Victorian waterways be obtained only from progeny that is genetically sourced from Victoria;

c) existing saline waters be used where practical.

The Committee considers that the National Translocation of Live Aquatic Organisms Policy is relevant and should be applied to the translocation of species outside their drainage basin of origin. It acknowledges that this policy may require further research into the original distribution of Victorian native fish. While outside the current Terms of Reference, the Committee notes that the most significant translocation issue facing Victoria’s freshwater systems is the introduction of exotic fish being brought into Australia for the aquaria trade. It believes that the relevant Commonwealth agencies limit or control such importation.

Provide Opportunity for the Farming of Other Species of Animal

Recommendation 19

That opportunities for the farming of other native-animal species be undertaken in accordance with following principles:

a) stock is obtained from pre-existing captive populations, or a special case has been made for stock to be obtained by ranching or wild-harvest (see Recommendation 20);

b) welfare needs can be met;

c) agreed codes of practice are in place prior to commencement of operation;

d) pastures are based primarily on native pasture;

e) total stocking rates are within land capability;

f) the ‘home territory’ of the farmed population to be totally within the farming property, or where the ‘home territory’ is larger than a single property, within adjoining properties under co-management;

g) where relevant, production forms part of a diversified operation (and ideally meet other objectives, such as soil-erosion control, shelter belts, and nutrient cycling).
Permit Ranching and, in Special Circumstances, Wild-harvest to the Extent Needed to Establish Cultivation or Farming

Recommendation 20
That ranching and wild-harvest only be permitted to establish cultivation or farming where undertaken in accordance with the following principles and conditions:

a) genetic resources are not available from a pre-existing captive population;
b) a business plan documents the bona fides of the proposed cultivation or farming operation;
c) a thorough assessment of total populations of targeted species is undertaken at the expense of the proponent;
d) take is subject to a sunset clause, or at least regular review;
e) if it has been established that the initial rate proposed will not cause adverse ecological impacts, with take only to continue as long as regular and thorough monitoring indicates that there is no risk of unacceptable ecological impacts; and
f) operations minimise by-catch and incidental damage and pose no threat to the sustainability of non-target species.

All species that are subject to consumptive use of wild stocks should be subject to management plans. Highest priority is for the production of such plans for ‘listed’ species that are proposed for utilisation (for example action plans under the Flora and Fauna Guarantee Act 1988). Such plans may cover an individual taxon, a grouping of taxa or a community. For small-scale utilisation, more limited management statements would suffice.

Recommendation 21
21.1 That management plans be prepared for all native species that are subject to consumptive utilisation of wild stocks and that any such utilisation only be permitted on the basis of compatibility with such plans. All management plans to be based on population assessments and be subject to regular review.

21.2 That utilisation not be permitted for any ‘listed’ species unless an action plan has been adopted and the utilisation is consistent with that action plan. Priority to be given to the preparation of action plans for species identified as having potential for utilisation.
Permit Ecotourism/Recreation Activity Based on Captive Resources

**Recommendation 22**
That ecotourism/recreation activity based on captive resources be undertaken in accordance with following principles:

a) registration of pets and restriction of numbers in domestic situations in line with existing provisions for domestic cats and dogs administered by local government;
b) all trade be subject to the provision of approved information on the health and welfare of the specimen, regulatory requirements and sources of additional advice;
c) only animals that are proven as suitable for captivity permitted to be kept in captivity.

**Recommendation 23**
That consideration be given to permitting public zoos to make wildlife that is in excess to their requirements available to wildlife parks or licensed enthusiasts.

Avoid Wild-harvest of Plants and Animals - Unless Special Circumstances

While the Committee does not generally support the encouragement of the wild-harvest sector, it considers that if a plant or animal is to be taken or killed in response to other legal requirements, or as an indirect consequence of other legal activity, then it has no ‘in-principle’ objection to such biota being put to some use.

**Recommendation 24**
That wild-harvest be permitted in the following circumstances:

a) if the plant or animal is being destroyed because of a legal purpose (that is for control or other legal harvesting, for example for timber production) and the level of take is independently assessed as being no greater than which would otherwise be killed;
b) to respond to Aboriginal cultural needs/desires.

**Recommendation 25**
That ‘salvage’ wild-harvest be subject to the following principles:

a) the salvage be undertaken by an appropriately licensed person and, where the salvage involves vertebrate animals, be undertaken in a manner that meets welfare codes of practice requirements;
b) the biota are ‘tagged’ or otherwise traceable from the field to the producer;

c) the level of take is independently assessed as being no greater than that which would otherwise be killed during the primary operation;

d) occupational health and safety requirements are met.

**Recommendation 26**

That the Committee supports in principle the salvaging of tree ferns from logging coupes, subject to further research being undertaken to establish the ecological sustainability and operational viability of this action.

The Committee concluded that there are several difficulties with using kangaroos killed as part of control programs as the basis of a kangaroo-products industry in Victoria. These relate to:

a) the relatively low kangaroo densities and consequently high costs of shooting and transporting kangaroos in Victoria;

b) small total numbers of kangaroos culled in Victoria compared with other States;

c) the above factors increasing problems associated with erratic supply;

d) potential for excessive pressure to increase the cull and make it more regular in line with industry need rather than population-control prerogatives; and

e) strong resistance from some sections of the community to such harvesting.

The Committee noted, however, that animals killed as part of kangaroo control programs in Victoria could provide the processing industry with a supplementary supply of carcasses to complement those supplied from interstate.

The Committee agrees with the Department of Natural Resources and Environment’s suggestion that any commercial utilisation of kangaroos arising from control programs should be preceded by an assessment of community support and:

An assessment of the number of kangaroos available for sustained harvesting in Victoria from private and leasehold land should be completed. This would assist in better determination of the impact on commercial industry viability of full cost recovery of a management/monitoring program, and the potential impact on kangaroo populations.

**Recommendation 27**

That while the Committee does not support the development of a kangaroo industry based on the harvest of the Victorian wild populations of kangaroos, it recommends that an assessment be made to determine whether the costs of the necessary management and monitoring systems associated with the commercial utilisation of kangaroos killed in bona fide control programs (that is licensing and tagging systems and assessment of the level of take being no greater than that
otherwise being killed during the primary operation) can be undertaken on a cost-recovery basis. Such an assessment to be undertaken in conjunction with and at the cost of industry.

The Committee notes that for a number of species that are killed for control (those that are declared ‘pests’ or declared ‘unprotected’) there is no requirement for population assessment or recording of the numbers taken.

**Recommendation 28**

That any native species currently declared or proposed for declaration as ‘pests’ under the Catchment and Land Protection Act 1994 or ‘unprotected’ under the Wildlife Act 1975 be subject to baseline and/or regular review based on population and damage assessments and that the taking of any such specimens be subject to a notification process to enable monitoring of the level of take.

Hunters are permitted to take designated game species and have them mounted, but not take them out of the country. This is because Victoria does not have a management program in place that has been approved under the Commonwealth legislation governing the export of native animals and their products.5

**Recommendation 29**

That accreditation be sought for Victoria’s current management program to permit the export of game trophies.

**High-tech Breeding/Cultivation/Farming**

**Recommendation 30**

That the screening and breeding of biota, and micro-organisms in particular, be permitted; with formal regulatory mechanisms actively developed to ensure the integrity of biodiversity in the wild and to provide for clear intellectual property rights, royalties or agreements.

**FACILITATION OF UTILISATION PRIORITIES - KNOWLEDGE AND RESEARCH**

The Committee believes that the provision of basic research information is fundamental to the successful development of all forms of utilisation - and that a research and development levy on output is an appropriate way to raise the required funds. In addition, the Committee advocates the requirement for compulsory reporting so that sound statistics can be collected on the various sectors to enable sound planning.
Cooperation and collaboration produce efficiencies and can be essential to provide the full range of information needed. The Committee notes the benefits of formal institutions adopting collaborative research based on researchers from different bodies working together at a single location, as at the Waite Institute in South Australia. It considers that such an approach is worth pursuing in Victoria.

The Committee also believes that government programs of research relevant to the utilisation of native species should be undertaken in close association with those involved in these sectors. Mechanisms are required to ensure that such research is targeted and coordinated and that provision is made for the long-term studies needed to determine the ultimate effects of utilisation, which can be complex and unexpected.

Moreover, the Committee believes that research is only effective if it is communicated in a useful way to those who need to use it. It recommends that more emphasis be placed on these aspects of research.

The Committee also acknowledges the contribution of amateur researchers and recommends that the exercising of discretion in the allocation of research permits be subject to clear guidelines that provide for bona fide amateur researchers.

Initial assessment needs to be undertaken prior to using adaptive management approaches, to ensure that a small-scale utilisation activity will not have irreversible impacts in the longer term.

The Committee recommends that a mechanism be created to ensure that traditional knowledge is documented and securely stored.

**Recommendation 31**

31.1 That Government assistance to native flora and fauna industries be substantially increased and focussed on research and development activity.

31.2 That the targeting of State Government assistance to research and development programs reflect the priorities of relevant peak bodies, with an emphasis given to collaborative research programs.

31.3 That opportunities for the co-location of State Government research institutions and researchers with Commonwealth Government, university and industry research groups be actively pursued.
**Recommendation 32**

32.1 That all licences, permits and authorities to breed or propagate Australian native flora and fauna be subject to the requirement for baseline survey of surrounding areas, a reporting of production statistics and the monitoring of the flora and fauna of surrounding areas to ensure that any infiltration or cross-hybridisation is identified.

32.2 That the State Government pursue regular monitoring of native species utilisation (especially of wildflowers, ecotourism and aquaculture) by the Australian Bureau of Statistics, with, if necessary, compulsory reporting.

32.3 That the State Government liaise with relevant Commonwealth agencies to seek greater input into the formulation of policy, controls and tracking mechanisms associated with the importation of aquaria fish into Australia.

**RESOURCING**

The Committee considers that most of its recommendations need not incur large commitments of resources, and that a ‘beneficiary pays’ approach will generally be applicable.

Nonetheless, there will be a need for additional resources to undertake its recommendations, particularly for increased monitoring and research. The Committee is aware that the broader community, as well as individual enterprises, is likely to benefit from improved utilisation of the State’s natural biota. In addition, it recognises that fledgling industries may not be in a position to support the full costs of monitoring and the research required to ensure their successful establishment. For these reasons, the Committee considers it appropriate for the Government to make a contribution to the costs of implementing its recommendations.

**Recommendation 33**

That the Government ensure that adequate resources are provided to implement the Recommendations contained in this report by:

a) providing adequate funding to agencies and institutions responsible for implementing the Recommendations; and by

b) placing appropriate levies on the industries concerned, in liaison with industry, at a level that recognises the special needs of fledgling industries.
These key requirements (reasons) were outlined in the Discussion Paper as to the rationale of utilising native biota, and have been slightly modified by the Committee in response to further information and submissions received.


DNRE suggested that such consultation include all stakeholders, including animal welfare and conservation groups, Victorian Farmers Federation and proponents of a commercial kangaroo industry.

The Department of Natural Resources and Environment, *Written Submissions*, No. U 67.

Under the Commonwealth’s *Wildlife Protection (Regulation of Imports and Exports) Act 1982*. 

CHAPTER 12
FACILITATING SELECTED SECTORS

- FACILITATING WILDFLOWER-BASED FLORICULTURE/HORTICULTURE
- FACILITATING ECOTOURISM
- FACILITATING AQUACULTURE
- FACILITATING NEW INDUSTRIES - GENERAL ISSUES

The Committee concluded that some sectors had greater potential to pursue ESD objectives than did others. In this chapter the Committee considers the factors that will assist the development in Victoria of a few of those sectors with the greatest such potential.

Recommendation 34
That the Government, research institutions and industry work together to facilitate the wildflower-based floriculture and horticulture, ecotourism and aquaculture sectors along the lines proposed in this chapter.

FACILITATING WILDFLOWER-BASED FLORICULTURE/HORTICULTURE

Victoria has an enormous floral resource with a large number of species suitable for development as cut flowers, nursery plants, ‘potted colour’ and for dried arrangements. Natural variation within species also adds another dimension to the possibilities for ornamental use.

Overseas countries, for example Israel, recognised the potential of our flora earlier than many Australian producers, and now export greater quantities of Australian native flowers than Australia. However, the richness and uniqueness of our floral resources, and our ability to access and test new strains, puts Australia in a position to capitalise on the seemingly insatiable world market for new plants. Our seasonal differences from the main producer regions are a third advantage, and a fourth is the presence of a climate well suited to the production of Australian native plants.

In order to survive in the fiercely competitive floriculture world market, the Victorian industry will need to focus on capitalising on its inherent competitive advantages. The Committee has identified several key areas that industry and government should target in order to achieve continued growth. These areas are:
  a) research and development, and promotion;
b) access to biological resources and intellectual property rights;
c) quality;
d) continuity of supply; and
e) access to export markets.

Research and Development, and Promotion

The Committee considers that a commitment by both government and industry to research and development of new floral products underpins the future of the Victorian wildflower industry. The richness of Australia’s floral resources, and our ability to access readily and test new plants, puts Victoria in a position to feed the huge world demand for new plants. This competitive advantage can, however, only be realised if adequate funding is directed towards the development and promotion of new, high-quality products. The importance of research and development to maintaining Australia’s competitive advantage is demonstrated by the commitment of competitors such as Israel to the development of new technologies and plant products.

As the supply of Australian native ‘filler’ flowers (such as wax flower) from other countries has increased, the price has fallen, and they have become commodities rather than niche products. Many believe that the industry should focus on producing a variety of high-quality ‘value-added’ flower products. A regular supply of new varieties will meet the demand for unusual flowers and command high prices. Importantly, growth of the industry is dependent not only upon the technical aspects of research and development, such as improved production and post-harvest treatments, but on the identification and understanding of the markets for new products; the development of rigorous quality control systems; and strategic promotional activities.

The Committee, while recognising that successful research and development programs rely on a commitment by industry, nevertheless considers that adequate government support is crucial. The success of research and development, and product promotion, relies on the translation of research results into practical outcomes. The coordination between all industry participants, including government, is thus important.

Industry Fragmentation

The cut-flower industry in Victoria has historically been fragmented, with a large number of industry organisations operating parallel to each other, both within the wildflower industry, and between wildflower and traditional cut-flower growers.

The Flower Export Council of Australia (FECA) is a key industry body (whose recent move to Melbourne was supported by the State Government). It is active in marketing and promoting Australian flowers, in market-access negotiations and in the development and promotion of quality-assurance programs.

The Society for Growing Australian Plants and the Australian Flora and Protea Growers Association are two other national organisations which promote and foster
the use of native plants within Australia. Another organisation, Flowers Victoria, represents both traditional and wildflower growers in Victoria.

A peak body, the Flower Industry Association of Australia was established recently to serve as an umbrella organisation for the whole industry. Organisations such as the Flower Export Council of Australia are members of this peak body.

The success of research and development programs and the effectiveness of promotional activities are heavily reliant upon achieving involvement and cooperation within the industry. The Committee considers it essential that the activities of the various national and State organisations are coordinated in order to provide strategic direction to the industry.

The Committee notes that the State Government has established the Garden State Advisory Council, which comprises representatives of industry, government and research organisations in Victoria. Its role is to advise government and industry on promoting and developing the ornamental and amenity horticultural industry in Victoria. The Committee considers that the group has a pivotal role to play in ensuring that research programs match the needs of industry.

Access to Biological Resources and Intellectual Property Rights

Historically the genetic resources of biota, and plants in particular, were considered as the ‘common heritage of mankind’. As noted in Chapter 9, the international Convention of Biological Diversity, however, provides an opportunity for countries to exercise control over their genetic resources. Within Australia, the national jurisdiction of indigenous biological resources is administered by both the State and the Commonwealth governments. There is, however, no national approach to policy and legislation in relation to this issue.

Australian species, on a number of occasions, have been developed and commercially exploited by overseas countries, without any royalties being returned to Australia. For example, the macadamia nut is now extensively produced in the USA and Australia now imports and pays royalties on cultivated varieties developed in the USA. Australian native wildflower markets are now being swamped by overseas production of these flowers - Israel and other countries produce greater quantities of kangaroo paw and wax flower than does Australia. There are no federal controls limiting the export of such genetic material. Once exported, it is difficult to assert ‘ownership’ rights of the genetic material.

One approach is to require a royalty payment on any material being taken from the wild. This is the approach now being taken by Western Australia and, it is understood, Queensland. Both of these States have a large number of endemic species and address the issue of controlling access to biological resources through legislation. This legislation provides for the payment to the State of royalties arising from commercial
use of its native flora and fauna. South Australia is entering into contractual agreements with overseas growers to supply material for subsequent development. It may be that more than one State will provide ‘exclusive’ access to the genetic material of a plant - where that plant is found in both States.

Some in the industry believe that the requirement for such royalty payments is a disincentive to the development of new cultivars and thus market opportunities for Australian business.

The Committee was informed by the Department of Natural Resources and Environment (DNRE) that currently Victoria provides fairly open access to biological resources and that the Western Australian approach is currently not the preferred option for Victoria.1

The Committee believes that an ad hoc State-by-State approach will not adequately address national issues, including indigenous people’s rights to genetic resources and the question of who controls access to native species that occur in more than one State.

The Committee supports the need for a national approach. Clear policy is required not only on how to provide appropriate access to Australian genetic material, but whether ‘ownership’ rights on this genetic material should be asserted and, if so, a policy on royalty payments - and the collection and distribution of any revenue generated.

The Committee notes, however, that world agricultural systems, including Australia’s, have historically been based on a free and open trade in germplasm. There must therefore be recognition of the benefits gained from the relatively cost-free introduction of exotic species into Australia, for example South African proteaceous species, which are a major component of the wildflower industry.

The Committee therefore believes that any policy on access to the State’s biological resources must not create impediments to continued access to and use of those of other countries’. The Committee believes that the genetic resources of the nation should be shared, but in a manner that is controlled and provides appropriate opportunities for Australian businesses and communities to benefit.

Benefit from the nation’s unique genetic resources could be obtained through:

a) plant breeders rights;
b) royalty payments; and
c) contractual arrangements.

The Committee considers that research and development of new plant varieties will be encouraged if those who invest time, money and effort can receive a commercial return on their investment. As outlined in Chapter 9, the patenting system and the Plant Breeders Rights (PBRs) system are two methods by which this can be achieved - by
conferring legal titles in new plant varieties to their breeders or discoverers. Both of these systems are subject to federal laws.

With respect to the latter system, the Committee noted that Australian breeders may license PBR varieties to overseas growers on condition that a royalty is paid on subsequent plant or seed sales and that the mature plants are sold under Australian trademark. Alternatively the Australian enterprise is only involved with the initial selection and breeding of material, which is developed and marketed by overseas companies under agreement. The Committee considers that while both of these methods return the commercial benefits of plant research and development to Australia, the ideal situation would see greater investment in product development within Australia.

The recently completed inquiry by the Cut Flower and Nursery Industries Task Force was informed that income from propagating material and royalties had the potential to be greater than the sale of plant products to overseas countries.

The Committee is also aware (as outlined in Chapter 9) that the initial intention of the original legislation was that PBRs would not apply to selections from a natural or wild environment; rather it was a scheme for new plant inventions. However, the 1994 legislation arguably allows wild varieties that are 'discovered' and then 'bred' to produce a stable line to qualify for a PBR.

The Committee considers that the granting of PBRs in varieties derived from wild selected species must be contingent on the ability of the developer to prove the effort and expertise required to identify, select and stabilise a wild species for cultivation. In keeping with this approach, the Committee notes that improved documentation relating to the selection and propagation process of wild varieties is now required by the Australian Plant Breeders Right Office to prove the intellectual effort required to bring new plants into cultivation.

It has been suggested that a sharing of royalties could be possible, where States assign limited exclusive rights to breeders to use wild material in return for a royalty payment. Breeders could then still use PBR to protect their selections or cultivars. Some argue that such an approach is unfair, as the commercial value of a plant in its wild state is small compared to the amount of intellectual effort, time and money invested in its development. In addition, the Nursery Industry of New South Wales has pointed to the public benefits derived from the propagation and commercialisation of rare and endangered species by the nursery trade. The Committee notes that the requirement to pay a royalty to the Government could unfairly penalise growers, and could be counter-productive to efforts to bring wild-harvested species into cultivation.

The Committee believes that, in the event that a State government demands a royalty for the use of native flora within Australia, it should be minimal, to ensure that
exploration and development of the native flora are not discouraged. The Committee suggests that an appropriate use of royalties imposed by governments on the commercial use of native flora would be the funding of in situ conservation programs.

The Committee did not receive any evidence that there is a demand for breeders’ rights to be available to breeders of native fauna. It is also aware of a view that places more importance on the encouragement of new plant development - to ensure a continual supply of new products into the market place is more important than pursuing plant breeders’ rights.\(^7\)

**Quality**

‘Quality’ is difficult to define, yet success in the world market, particularly in Japan, is heavily dependent upon the provision of ‘quality’ product. For export markets to flourish, the produce must achieve the standards expected by overseas customers. The perception by customers of quality involves not only the aesthetic quality and vase life of the flowers themselves (which will depend on cultivation, harvest, post-harvest and transport practices), but administrative and service aspects as well.\(^8\) Service aspects include supplying product on time and to specification, and providing accurate and complete documentation. Exporters are in a good position to define ‘quality’ to the growers on the basis of the needs and expectations of overseas customers. Once the flowers reach the exporter, the exporter must have his or her own systems in place to ensure that standards achieved by the growers are not compromised.

The Committee notes that there are a number of quality-assurance schemes available to the industry, including international schemes such as ISO9002, that provide principles and systems for assessing and implementing quality standards. Participants achieving quality-assurance accreditation are audited at intervals to ensure that standards continue to be met.

The ‘Australian Quality Assured Flowers’ program is a system designed specifically for all participants in the Australian flower industry, including growers, exporters, wholesalers and retailers. This program aims to improve the consistency of cut-flower quality, using minimum quality standards based on accepted international flower grades, and incorporating a quality system so that the treatment flowers receive from planting to post-harvest to sale can be controlled and tracked.\(^9\)

The Committee spoke to the quality manager for the Melbourne National Flower Centre\(^10\) and learnt that more than 30 Victorian flower growers are now part of the scheme, which has now been extended to include flower wholesalers and florists. The national scheme was created from a Victorian-initiated program.

The industry is divided as to the benefits of such schemes. They are criticised by some as being too administratively cumbersome, particularly by successful growers who generally have their own systems in place to ensure a quality product, and who believe
that price mechanisms serve as the best indicators of quality. Others have found that a quality-assurance system has benefited their business performance greatly, giving them an advantage over competitors who do not have quality-assurance accreditation. A marketing strategy for the Australian industry has been suggested that would see all growers and exporters who attain accreditation - from any of the wide range of recognised quality-assurance systems - united under a national umbrella body and logo to reinforce and enhance Australia’s quality image to overseas customers.

The importance of the quality of product was impressed upon the Committee by all those organisations and businesses contacted during its study tour to Amsterdam, and it strongly advocates the application and development of the ‘Australian Quality Assured Flowers’ program.

**Continuity of Supply**

The Committee was advised that a major barrier to establishing and maintaining overseas markets was the inability of the industry to supply adequate quantities to overseas customers - that is, demand for the products exists, but Victorian growers are often unable to supply the quantities required. Exporters who need to obtain material from a number of growers may then be faced with inconsistencies in the product supplied - different growers may have different interpretations of, and approaches to, quality standards.

As noted above, wildflower growing represents a business ‘sideline’ for many producers, and the majority of plantations are less than five hectares. Notwithstanding the many successes and rapid growth of the wildflower industry in Victoria, wildflowers can still be considered a developing industry. For such an industry there will be a transitional period where producers diversify and test the market, before dedicating production to new crops. A ‘Catch-22’ situation may arise where the potential for market development exists but is hindered by the quantity and quality of product that is being offered. A major Victorian exporter who often has difficulty providing the quantities of material requested by overseas importers has suggested that more plantations of commercial dimensions (greater than 20 hectares) are needed.

The Committee was informed that not only are larger holdings required, but more growers are needed to produce newly developed varieties to expand the range of flowers and foliage available to overseas customers. A greater number of growers producing wildflowers over a larger geographic range would also assist in improving continuity of supply by extending the period of flower availability. The Committee was informed that a major issue is getting growers to grow the new products developed by researchers. Growers are hesitant to move into new crops, as they are unsure of which plants to grow, how to grow them and the likely returns.
The Committee notes that the Institute for Horticultural Development and the Garden State Advisory Council are currently working on a ‘Best Bets’ program, with the assistance of major exporters. This will identify species (native and exotic) considered to have the greatest commercial potential and provide growers with available information on cultivation requirements. The Committee considers that such extension activities are an essential component of the development of the industry and should be encouraged to ensure that research efforts are translated into practical outcomes.

Access to Export Markets
The Committee notes that the Cut Flower and Nursery Industries Regulatory Reform Task Force, through the State Government’s Office of Regulation Reform, has recently completed a major review of regulatory arrangements in the Victorian cut-flower and nursery industries. The Committee commends the report of this review to readers and notes that many of the issues addressed by the Task Force are directly relevant to native-plant sectors of the industry. A number of export issues peculiar to, or of particular relevance to, native-plant industries are highlighted below.

Export Permits
As noted in Chapter 9, the federal agency Environment Australia manages Australia’s CITES obligations under the Wildlife Protection (Regulation of Exports and Imports) Act 1982 and is responsible for the issuing of all permits for the import and export of native flora. Export permits may be obtained either by individuals on a case-by-case basis or, alternatively, Environment Australia can issue an authority for businesses in States that have in place a Management Plan for the artificial propagation and commercial wild-harvest of native flora. The Australian Customs Service is responsible for inspecting consignments to ensure that they match the permits.

Victorian exporters of native flora raised concerns to the Cut Flower and Nursery Industry Regulatory Reform Task Force about the long time taken for the issuing of export permits by Environment Australia. The Task Force identified a number of impediments that need to be addressed in order to expedite the issuing of export permits.

First, unlike Western Australia and Queensland, Victoria does not have in place a State management plan for the artificial propagation and commercial wild-harvest of native plants. Victorian exporters of native flora therefore face a greater regulatory burden in obtaining export permits than their competitors in States that do have a plan in place. The Task Force recommended that the DNRE develop a State management plan as a matter of priority.

Second, in some cases the Australian Quarantine and Inspection Service (AQIS) requires the same information for phytosanitary certificates as that required by
Environment Australia for the issuing of export/import permits. The Task Force recommended that Environment Australia accept copies of phytosanitary certificates, where appropriate, to satisfy export permit requirements. AQIS has indicated support for such an approach.

The third issue is the efficacy of Customs inspections of export consignments. Environment Australia has acknowledged criticisms that Customs officers lack the technical skills to ensure that consignments match permits. The Task Force recommended that AQIS be responsible for inspecting native-plant exports, rather than Customs Officers.

The Committee endorses the Task Force recommendation that the DNRE, as a matter of priority, develops a State management plan for the artificial propagation of native plants and for commercial harvesting of a limited number of native plants from the wild.

The Committee notes that a management plan is currently being developed for the harvesting of tree ferns, and that one for flowers and foliage is intended. The Committee considers that the implementation of a formal management plan is essential, not only to assist the industry by expediting export permits but, importantly, to ensure that wild-harvesting and cultivation practices are sustainable.

The Committee, while recognising that quarantine and inspection services are within federal jurisdiction, supports the streamlining of these processes for native-plant exports. The Committee considers it appropriate that AQIS and Environment Australia review their quarantine and inspection procedures to avoid duplication. The Committee also considers that unless personnel with the appropriate expertise check consignments, the intent of export legislation to protect endangered species will be greatly undermined.

**Air Freight Costs**

The Cut Flower and Nursery Industries Task Force was informed that exporters are concerned about the lack of adequate coolroom facilities at Tullamarine, and the capacity, quality and cost of freight services offered. The Committee notes that the Victorian Airfreight Council has recently established a Perishables Industries Task Force to address issues raised by exporters of perishable goods. The Victorian Government has also recently appointed a Perishable Industries Manager to Business Victoria, who is currently negotiating for the expansion of coolroom facilities at Tullamarine airport. As noted above, the majority of floral exports from Victoria are native plants, therefore efficient, cost-effective transport is essential.

The Committee supports the above efforts to ensure that Victoria's competitiveness in overseas markets is not unduly reduced by deficiencies in freight services.
FACILITATING ECOTOURISM

Ecotourism based on access to wild-populations of native flora and fauna may be based on either minimal facilities or reliant on discrete major facilities. Though a complex industry with many intersecting sectors, its self-regulating processes have by and large been successful in managing the business and marketing sides of the industry. The Committee has identified several key areas which industry and government should target in order to achieve continued growth. These areas are:

- a) product and market research;
- b) quality control;
- c) maintaining the resource; and
- d) development of approval processes.

Product and Market Research

The Committee understands that a successful ecotourism industry relies on effective product and market research. Research and knowledge requirements of particular relevance to nature-based tourism are:

- a) potential demand for expansion of nature-based tourism;
- b) sustainable levels of use in different environments;
- c) which tourist activities relate to which impacts;
- d) least-cost ways to avoid, control or mitigate degradation;
- e) effective ways to ensure that economic benefits are used in the local economy and to maintain the resource; and
- f) appropriate monitoring systems to measure the impacts of tourist activities on ecosystems and local communities.

Work undertaken by the Canberra-based Bureau of Tourism Research, in conjunction with several universities, assists with the collection of statistics that underpin such research. Its research differentiates between:

- a) economic research - conducted from a broad community perspective and considering all costs and benefits to the entire community, financial and non-financial; and
- b) financial analysis - from the perspective of the proponent of a project and concerned with the risk and financial viability of the project.

The Committee considers that this distinction is helpful and that both approaches are relevant in the targeting of products and markets.

There remains, however, a need for more and better information on which to base planning for tourism. The Committee has not found evidence of the well-planned and integrated research and monitoring that is needed to support nature-based and native-species-based tourism in Victoria. Currently such research, monitoring and surveys as occur in these segments of Victoria’s tourist industry appear to be done on
an ad hoc basis. The work of the Collaborative Research Centre for Tourism and other centres is valuable, but does not address Victoria’s native-species-based tourism specifically.

The Committee considers that there is need for better-targeted research to address the requirements of the industry, particularly as it relates to Victoria. This should be based on preliminary scoping studies/workshops, possibly conducted by the Collaborative Research Centre for Sustainable Tourism, to determine how future research can best be targeted and so ensure that the economic benefits of an expanding tourist industry are captured in ways that are ecologically and socially sustainable. Government could assist by providing seed funding for such activity.

Quality Control
Would-be nature-tourism operators are dealing with a complex industry - there are economic, ecological, social and educational objectives to be met. Moreover, operations need to be tailored to the strengths and needs of specific districts. These often include the vagaries of climate and the seasonal variability of native flora and fauna display. Furthermore, the ecotourist market is known to be somewhat fickle and demanding. This is particularly so for those catering to tourists interested in native-species-based products.

A number of mechanisms are used to achieve product quality control and so meet the expectation of the consumer as well as achieve sustainable tourism objectives. These include the use of codes of practice, licensing and accreditation, and training.

Codes
Each of the industry associations concerned with tourism in Victoria has its own Code of Practice or Conduct. The Australian Tourism Industry Association has a Code of Environmental Practice that was developed for it by the Ecotourism Association of Australia in 1990. Other codes of practice that have a sustainability focus have been developed by several other organisations, such as the Code for Environmentally Responsible Tourism prepared by the Pacific Asia Travel Association and the Ecotourism Association of Australia’s Code of Practice.

Such codes of practice provide a valuable foundation for the development of native-species-based tourism that is both sustainable and attractive to tourists. However, it seems that to be most effective some form of enforceable process is required. The accreditation mechanism has proven a most effective method.

Accreditation
Tourism accreditation programs are now being developed around the world. Within Victoria, tourism accreditation is being developed and implemented through the ‘Tourism Accreditation Board of Victoria Inc.’ There are two accreditation programs relevant to native-species-based tourism. These are a Tourism Accreditation Board of
Victoria’s ‘Certified Tourism Business’ program and the ‘National Ecotourism Accreditation Program’, which specifically accredits ecotourist programs.\textsuperscript{31}

The focus of the ‘Certified Tourism Business’ program, which is now used throughout Australia, is the business side of the tourist industry.\textsuperscript{32} It aims to set minimum standards for risk management, consumer satisfaction and mechanisms for continual improvement of performance.\textsuperscript{33}

The ‘National Ecotourism Accreditation Program’ was established in 1997 and was the first ecotourism accreditation program in the world.\textsuperscript{34} It was developed by the industry to maintain its standards and reputation. It is focussed on the sustainability and educational aspects of ecotourism. At present the program has two levels - ‘Advanced’ and ‘Core’. It plans shortly to accredit a third level - ‘Nature tourism’ -, which will address sustainability values but will not emphasise education.\textsuperscript{35} By mid-1999 it is estimated that there were more than 175 accredited ecotourism programs under the program and approximately 200 operators accredited Australia wide.\textsuperscript{36} Note that programs are accredited rather than the operators.

Both programs were developed in response to the desires of the industry to maintain and improve its standards and reputation. They use self-administered assessment with review.\textsuperscript{37} Fees are aimed at cost-recovery rather than profit. In this way they should not present a barrier to operators becoming accredited.\textsuperscript{38}

The Committee notes that Parks Victoria has recognised the value of accreditation. Non-accredited operators within its parks must obtain licences annually. An operator with either form of accreditation can obtain a three-year licence, and plans are in hand to provide a seven-year license for an operator with both forms of accreditation.\textsuperscript{39} Tourism Queensland also actively promotes accreditation among tour operators as a means of improving the standard of tourism in that State.\textsuperscript{40}

The Committee understands that these accreditation programs are also proving to be a highly educative process - participants find that becoming accredited leads to improved operations.\textsuperscript{41}

The ‘National Ecotourism Accreditation Program’ is currently reviewing its program to meet the needs of specific States and Territories more precisely.\textsuperscript{42} The Committee strongly supports the use of this accreditation scheme by the Victorian ecotourism industry.

\textbf{Training}

Appropriate training is a common vehicle for tourist operators to obtain accreditation.\textsuperscript{43} It is also seen as important to high-quality tourism.\textsuperscript{44} Such training needs to be relevant to the particular sector, including native-species-based tourism.
'Tourism Training Victoria' is the operating name of the Tourism and Hospitality Industry Training Board of Victoria Inc. The Board was established to improve training for the Victorian tourism industry, and acts as a broker for training programs offered through various educational institutions in Victoria. As well as facilitating access to training through the TAFE system, Tourism Training Victoria provides library facilities and offers training itself, where a need is identified. The last includes seminars for individuals or groups contemplating starting new tourism ventures. Representatives of a range of industry associations are members of the Tourism Training Victoria Board. This ensures strong links with, and understanding of, the tourism industry.

Preece et al. consider that the: tourism industry has a very proactive role, a duty and an economic incentive to communicate ecologically sustainable practices and management needs to the huge number of tourists they convey and to whom they interpret ... Tour guides have a captive audience and an opportunity to teach more people about the Australian environment than all universities and schools.

Consequently, they conclude that tour operators generally (not only those formally involved in ecotourism) should have training that will help them to engender ecologically sustainable behaviour in tourists. They recommend that:

Education programs covering the basics of environmental science and ecology be a component of training and accreditation procedures for travel agents, tour operators and field staff.

Several institutions offering tourism training are taking this need on board. A number of educational institutions in Victoria are providing such training in both specialist and general courses.

Courses specifically for tour operators and guides are available. Tourism Training Victoria is again the point of contact for these courses. However, there may still be a need for improved training that enables guides to “become educators who give contextual knowledge” and for more Koori teachers/guides.

Tourism courses with segments on nature-based tourism or ecotourism are also provided by most of the universities.

A range of literature providing principles is available, including a handbook tailored to the needs of small, community-based operators. The community-based approach has a high potential for achieving benefits to the community as well as meeting the other objectives of ecotourism. It is a complex approach, however, and the value of having a facilitator is well demonstrated.

The Committee commends the tourism industry, in collaboration with Tourism Victoria, for taking such a proactive role in training and assurance programs aimed at
improving and maintaining standards, including sustainability, within the nature-based sector of the industry.

The Committee recognises that these initiatives are very recent and considers it important that the present impetus be maintained. Independent assessment of the effectiveness of industry training is needed to ensure that standards continue to improve and that shortfalls in programs are identified and addressed.

Tourism Training Victoria prepares Industry Training Plans each year, with eight completed as at June 1999. Its Plan 2000-2001 Tourism and Hospitality Industry Training Plan presents broad recommendations. It does not address native-species-based tourism as such, but draws attention to the needs of nature-based tourism. It does recommend:

a) consultation with local operators to determine their training needs;
b) provision of diverse training to meet the needs of each segment of tourism;
c) involvement of indigenous communities (who are likely to lay some emphasis on native species); and
d) linking training to accreditation programs.

Maintaining the Resource

The ecotourism industry is dependent on a natural environment that is in good condition. The health of the native-species-based ecotourism sectors of the industry is directly proportional to the health of the population of native species. The dilemma for the industry is that it is not the manager of the natural resource - only one of a number of competing user groups. The industry can, however, become involved with the planning of such resources.

Planning for Ecotourism

The Committee recognises that in order to protect the resource used for nature-based tourism and ensure the welfare of the local community, strategies and plans need to be long term and based on an ecosystems approach to planning and management.

Such planning should:

a) be sensitive to the scale and type of tourism, and its effects on local culture;
b) make sure that income is provided to local people whose lands and lives are affected;
c) take full account of the goals of protected areas;
d) provide access to visitors from a wide range of economic backgrounds;
e) tailor management to the conditions of the specific location; and
f) encourage codes of practice and accreditation systems for tour operators.
According to Preece et al:

The need for an integrated approach, based on regional planning for biodiversity conservation and the development of tourism, has been recognised in a number of important policy documents, including the National Strategy for Ecologically Sustainable Development, the Final Reports of the ESD Working Groups (in particular Tourism), the National Ecotourism Strategy (ESD), the National Tourism Strategy and the Draft National Strategy for the Conservation of Australia's Biodiversity. 61

The Committee notes and endorses the observation of the ESD Working Group on Tourism that:

If tourism is to develop in an ecologically sustainable way, the current political and institutional fragmentation existing in land-use planning will need to be overcome. 62

Preece et al. emphasise the need for systematic planning based on the “identification and management of key bioregions, ... combined with a detailed assessment of natural features that attract tourists”. 63 In other words, it should be the characteristics of the environment that are the principal determinants of planning and management boundaries. 64 These include vegetation types, catchment areas, climatic factors and human uses. There should be a hierarchy of levels at which planning and management occur, from continental to regional and local. Each level should be based on a similar scale in environmental patterns. At the detailed level, maximum carrying capacities for visitors and operators for particular sites should be set and rigorously enforced.

The Victorian Department of Conservation and Natural Resources (now Parks Victoria) has taken a bioregional approach to developing regional plans for tourism. 65 Market research has also been undertaken to determine public perceptions of regions, what tourists expect there, barriers to change, problems of distance and accommodation and needs for on-site accommodation. 66

Methods to protect natural values may also involve:

a) planning legislation;
b) zoning and management to match activities and site capacities;
c) limiting visitor numbers through fees or quotas - this is difficult as visitors, revenue raisers and those responsible for protection have different goals; visitors more tolerant of degradation will come as the site runs down;
d) providing visitor education and guide services;
e) selecting visitor type - that is for low impact and high spending - this may create problems of fairness and conflict with the preceding strategy, but low-impact facilities and type of presentation may encourage low-impact visitors to the most sensitive areas;
f) educating visitors, guides and entrepreneurs (this is a long-term approach);
g) training guides/interpreters from the local community; and
h) hardening the resource (for example providing raised walks and viewing areas, barriers to vehicles, appropriate zoning and ‘honey pots’ to draw visitors away from sensitive areas). 67

**Industry Contribution**
The potential for incremental damage of the resource - the natural populations and ecosystems - is ever-present in a growth industry. For this reason actions to ‘minimise impact’ may not be sufficient to insure long-term sustainability - active management is needed. 68

The Committee believes that, as a user of the resource, the industry has a vested interest in its maintenance and it is appropriate for it to provide funding or in-kind support to manage and sustain these natural resources. Industry may need incentives to contribute to the conservation of its resource base (rather than rely on altruism and philanthropy). Potential actions include:

a) correcting the current deficiency in funding of the research and management needed to protect the natural resource; 69

b) providing secure protection of habitats on private land, which is often committed to other agricultural production;

c) informing the tourist industry more fully about its environmental responsibility; 70

d) developing funding mechanisms and economic instruments to provide for proper management, maintenance and repair of the resource. 71

Options for raising funds to support the resource include:

a) entrance fees;

b) donations;

c) payment for associated services or products; 72 and

d) private investment. 73

The Committee accepts that one of the challenges of tourism is to ensure that contributions towards maintaining the natural resource from monies received by the tourist industry is equivalent to the importance of the resource to the tourist enterprise.

**Government Contribution**
Tourism is a difficult sector for governments. 74 Its character, boundaries, needs and outputs are not easy to identify; its structure is diffuse. The infrastructure required is both ‘hard’ (roads, airports, hotels, wildlife parks) and ‘soft’ (guides, information, a welcoming culture). All are important; none is sufficient in itself. Where promotion is concerned, there are large externalities; the region or attraction that finances promotion is likely to attract visitors to its neighbours as much as to itself.

Moreover, the resource, particularly for nature-based tourism, is often common property prone to the two main hazards of commons - overuse and the lack of incentive for anyone in particular to invest in the care of the resource. 75 Local
government, which provides many of the services required by tourists and bears much of the cost of their impacts, may reap little in return.\textsuperscript{76}

Stimson et al. consider that, if the benefits of tourism are to be maximised, governments need to:
\begin{itemize}
  \item[a)] ensure highly coordinated effort between the different levels of government;
  \item[b)] ensure long-term and well-coordinated strategic planning and management; and
  \item[c)] ensure timely provision of infrastructure.\textsuperscript{77}
\end{itemize}

Preece et al. recommended that governments encourage sustainable practices, including restoration of habitats, through taxation incentives.\textsuperscript{78} They cite a Victorian example whereby reduced fees have been negotiated by a company that provides assistance in-kind for public land conservation. Such an approach would fit well with the desire of some tourists to be involved in conservation works.

There is a range of possibilities for the involvement of government that are relevant to native-species-based tourism.\textsuperscript{79} These include that:
\begin{itemize}
  \item[a)] regional planning capabilities be developed jointly with Federal, State and Local governments for the encouragement and management of ecotourism - this involves the development of information and data systems, modelling capabilities and arrangements for collaborative planning processes;
  \item[b)] Environmental Impact Assessments (EIAs) should be examined to determine their efficiency in achieving conservation - this requires, among other things, that greater attention be paid to the cumulative impacts of development;
  \item[c)] support should continue for resource-attribute surveys, monitoring programs, State of Environment Reporting and work on environmental indicators;
  \item[d)] governments should continue to promote Australia's rich diversity of ecosystems and species to overseas markets;
  \item[e)] education and training, for tourism operators and on a more general basis should be a basic ingredient of a national strategy;
  \item[f)] the costs of providing facilities for tourists on public land should be raised through charges to tourists or tour operators on a user-pays basis where the cost of enforcement would be practicable;\textsuperscript{80}
  \item[g)] indirect taxes on goods used in conjunction with nature-based tourism could be used as a revenue-raising mechanism for maintaining the resource, but that such revenue should be returned to the region for such support;
  \item[h)] methods to encourage benevolent contributions should be developed, including the options to enhance corporate images;\textsuperscript{81}
  \item[i)] concessions be offered for compliance with Codes of Practice;
  \item[j)] governments support conservation of habitats on private land because of their external benefits through taxation or other incentives; and
\end{itemize}
k) innovative funding mechanisms be investigated to cover costs of research, market analysis, environmental management and demonstration to stakeholders of the benefits of protecting habitats to the industry.

Development Approval Processes

The facility-based ecotourism segment is reliant on the development of facilities in areas that are often remote, environmentally sensitive and, often, locally controversial.

The Committee received evidence that the planning and approvals processes involved in major facility-based ecotourism operations were inordinately long and complex. There appears to be tension between attempting to ‘fast track’ such processes while providing for effective public consultation. It seems that this process was complicated through approvals being required for gaining access to public land as well as to undertake the actual development.

The Committee, in its Inquiry into Planning Issues for Extractive Industries, has previously considered the planning-approvals process for the extractive industry. Operators were required to seek approvals under legislation dealing with extractive industries as well as planning. The Committee recommended that “there should be a retention of the dual system of both planning and licence approval, but with a simplified operational extractive industry licence”. Similarly, the Committee believes that Crown land licence approval should be restricted to operational matters - with the consideration of planning issues restricted to the planning permit.

The Committee also reiterates some of the principles that it established in this previous Inquiry regarding integrated approvals and single adjudication. It considered that the planning system in relation to ecotourism development should provide greater certainty and should be in accord with the following principles:

- a) a proposal should be guaranteed a hearing;
- b) a proposal can, if required, be heard in an independent forum;
- c) there should be integrated approvals;
- d) there should be no undue delay in the approvals process;
- e) there should be a single adjudication and planning approval should be for the life of the development.

In major developments the Committee also considers that it would be useful for the general principles of a development to be determined and agreed to through an open planning process that is separate from the creation and approval of detailed design. This would enable a proponent to have assurance of an ‘in principle’ approval of location and scale and use, prior to having to commit to detailed design. It would also assist in creating more effective public debate and input.
FACILITATING AQUACULTURE

The Committee views the closed-system farming of fish and other aquatic species as an appropriate and indeed desirable form of native biota utilisation. While a successful growth industry, it is still in many senses developing and it is evident to the Committee that, like many such developing industries, it may benefit from assistance that, in more mature industries, would be provided by industry organisations.

The key areas where assistance is likely to be needed and most relevant to the growth of the freshwater native-species-based sectors of Victoria’s aquaculture are:

- a) development of appropriate industry ethos and structures;
- b) research and development;
- c) dissemination of knowledge; and
- d) the interpretation and development of markets.

Development of Appropriate Industry Ethos and Structures

**Philosophical Approach**

From the point of view of ecological sustainability, the farming of a native species, if in a genuinely closed system, presents no more threat to ecological processes and biodiversity than does any other form of farming.

In the Committee’s opinion, native-animal farming should thus be subject to the same requirements as other types of farming with respect to pollution, health, cruelty and planning regulations. The Committee sees no need to impose special environmental restrictions on native-species farming, other than those needed to ensure that farm-bred animals do not escape to the wild and that native animals are not taken from the wild.

Consequently the Committee believes that aquaculture needs to be recognised as a form of farming by regulators. Equally, aquaculture needs to be recognised as farming by entrants to the industry.

The Committee was able to consider the views of the Aquaculture Regulatory Reform Task Force and to take them into account. This Task Force undertook a review of regulatory arrangements in the Victorian aquaculture industry and has recently published a report of its findings. As part of the review process, industry representatives indicated that current legislation and regulation are reasonable but that there are some issues of concern, such as difficulties with clumsy application of regulations. The industry advocated a desire for a ‘one-stop shop’, where all regulatory requirements can be explained and dealt with through a single process. The Task Force recommended that Fisheries Victoria be established as the ‘one-stop shop’. It also recommended that the relevant regulation be reviewed, “to provide sufficient flexibility in regulatory arrangements to recognise the needs of aquaculture as well as
those of the wild-capture sector, while still ensuring protection and sustainability of the natural wild-stock resource for all purposes”.86

The Task Force also made a range of detailed recommendations to improve licensing criteria and systems, planning and best-practice guidelines, and auditing of environmental compliance. In addition it suggested the creation of a more transparent ‘translocation’ policy - for the cultivation of species in areas beyond their natural distribution.

The Committee supports the general thrust of these recommendations, but considers it appropriate to make a clear distinction between those forms of aquaculture that are reliant on ranching (notably eel production) and those more mature operations that are effectively independent of the wild resources.

With respect to the industry itself, the Committee notes that, while it wants to be considered as a mainstream farming sector, views more generally associated with a wild-harvest perspective remain. For instance, a significant amount of production still occurs in farm dams, which are stocked and harvested with minimal further effort to enhance production.87

**Industry Organisation**

It can be difficult for new industries to strike the right balance between vertical integration and specialisation. While the former appears to be necessary to ensure that production, processing and marketing grow together, small new businesses will seldom have the expertise or resources to make vertical integration work beyond the cottage-industry scale. Nor should the self-sufficiency of the individual business become an impediment to development of strong organisational networking and cooperation across the industry. Vertical integration through cooperation between industry segments and with input of appropriate expertise appears to be the mix that is needed by very new industries.

The Committee is aware that a number of industry associations have been created, including, most recently, the peak umbrella group, the Victorian Aquaculture Council. Such industry organisations can play a key role in the growth of a developing industry. The Committee sees a role for government in facilitating cooperation through such industry organisations and networks.

**Research and Development**

Research and development has been identified as a key requirement for growth of native-plant industries; the Committee recognises its equal importance to native-animal industries. Precisely what research is most needed varies with the sector and the Committee considers that it will often be identified best by the industry itself.88 However, an industry, especially a young industry, is unlikely to have the resources or expertise to undertake the research and development needed.
Industry may provide direction and support for research and development. However, it is the Committee’s opinion that government will need to play a role in providing expertise and facilities. Government can also help young industries to identify the most fruitful directions for research and development through pilot or scoping studies, and collaborate with industry in adaptive management research.

Basic research and development regarding life cycles and husbandry of relevant species and their marketing appear to be the forms of research which need to be undertaken.

**Dissemination of Knowledge**

The Committee has recognised that dissemination of knowledge is as important as the research that provides the knowledge. Dissemination of knowledge is required to both potential entrants and existing aquaculturists. The Committee recognises that new industries are unlikely to have either the resources or the skills to ensure that information is disseminated efficiently.

Government already plays an important role in this field through the activities of its various departments, particularly the DNRE. A number of training institutions also play a part. It is the Committee’s opinion that these activities should continue and, in some cases, be strengthened or extended where native-species farming is concerned. As a leading representative of the aquaculture industry wrote:

> The best value for money [for the native-species aquaculture industry] would be to appoint a warm-water specialist as Inland Extension Officer … stationed in the North West to provide a regular service [in] the Murray Darling Basin.\(^\text{80}\)

The Committee considers that appropriate training and extension should be made more available in regional centres where native-animal farming is occurring and/or in forms which are accessible to people in these regions - such as through distance education or Internet communication.

**Interpretation and Development of Markets**

The difficulties experienced by entrants to new industries in knowing what consumers want, matching consumer demands and developing new markets has been discussed in earlier chapters. The Committee concludes that it is essential for new or developing animal industries to obtain adequate resources and expertise in this area. Markets must be clearly identified, the production and presentation must match market demand and effective market development should be undertaken if the success of a new industry is to be ensured. A partnership between government and industry is likely to be most efficient in ensuring a good match between production and markets.
Infrastructure
The Committee is aware that the expansion of the aquaculture industry is reliant on both domestic and export markets. Given that the product is often sought in a fresh form, the provision of adequate transport infrastructure is vital. This is particularly important for the export market.

FACILITATING NEW INDUSTRIES - GENERAL ISSUES

The Committee concludes that native species can form the basis of some desirable new industries in Victoria. Those that show most promise at present have been identified, but others with potential are likely to arise in the future. The Committee has found several broad principles that can be applied generally to the facilitation of new industries based on native species. It also broadly supports the findings of a study by the Rural Industries Research and Development Corporation (RIRDC) into factors that lead to the success of new crop industries.90

Factors assisting or hindering success of new industries relate to production, processing and marketing phases.91 Consequently the Committee concludes that all three phases of development will need to be assessed. Should it be concluded that the industry deserves to be promoted, all three will need to be given appropriate support.

Circumstances in which new industries are being developed continually change. Factors to be dealt with are becoming more numerous and complex, markets are increasingly diverse and demanding and competition tends to be more intense. Technology is becoming more complex and is largely replacing labour. Constant challenges that attend most new ventures include high levels of risk, long time-frames, shortage of relevant information and the need to establish new techniques.92

The RIRDC found that there is a large number of factors that may encourage or inhibit success of a new industry and that these factors vary with the industry.93 Though it is not easy to predict which new industries are likely to succeed, the Corporation found several key factors that are often present in successful ventures.94 Important among these is government support for research and development.

Other factors identified by the Corporation relate to the nature of the new industry. It was determined that the risk and the difficulty in achieving success usually increase in the following order:

a) an established product is being grown in a new locality;95
b) an established crop is being put to a new use;
c) a new species is being put to an established use;96 or
d) a new crop is being put to a new use.97

Industries that use native plants and animals generally fall into category (c) or (d).98
The Corporation also found that a new venture that can readily be incorporated into existing farming systems has an improved chance of growing and becoming a substantial industry.\textsuperscript{99}

Involvement of large companies can be useful, though not essential, for the success of a new industry. This is consistent with the Committee’s finding that several successful native-species businesses have grown out of other mainstream ventures (for example the conventional food and restaurant industry)\textsuperscript{100} or were in the process of placing their products into mainstream outlets.\textsuperscript{101}

A long period before profits are generated can constrain development of a new agricultural industry, but this is not usually the most important factor in determining ultimate success.\textsuperscript{102}

The RIRDC also found that some factors commonly considered to affect success of new industries did not appear to be particularly important. Industries may both become large and grow quickly, regardless of the type of product, degree of integration of production and marketing, extent of geographical dispersion or domination by individual growers. Therefore restriction on the support given to a new industry should not be dictated by these circumstances.\textsuperscript{103}

Having identified potentially successful new industries, the Corporation determined that actions that may facilitate the growth of these industries include:

\begin{itemize}
  \item [a)] a champion - that is, an entrepreneur to identify opportunities, marshal resources and assist in product marketing;
  \item [b)] a strong market focus – particularly good communication to customers and a thorough knowledge of market requirements and size and understanding of long-term industry strategy, processing requirements and value-adding opportunities;
  \item [c)] a good location – which meets the key needs of the particular venture; and
  \item [d)] an appropriate government role.\textsuperscript{104}
\end{itemize}

**Government and New Industries**

Although the Committee considers that it is desirable for industry to play a major part in directing its own future, government has an important role to play in cooperation with industry.

The Committee identified instruments by which governments can provide assistance to those industries that are assessed as having reasonable potential for success. These include:

\begin{itemize}
  \item [a)] providing mentors for the new industry and facilitators to new entrants;
  \item [b)] providing adequate information and guidelines to industry entrants, facilitators and administrative staff;
  \item [c)] making the regulatory process an educative one as well as a controlling one;
\end{itemize}
d) using people who have a good understanding of the industry to prepare regulations/guidelines;

e) supporting market development;

f) where appropriate, regulating the new industry (as for example through quality standards); and

g) providing taxation incentives.\textsuperscript{105}

With respect to marketing, the Committee noted that domestic markets appear particularly important for new industries; these should be developed before, or at the same time as, developing export outlets.\textsuperscript{106} Governments could play a role in market development, for example through such bodies as the Coordinator of Agricultural Marketing.

The Committee also recognises that, in assessing the value of a new industry, a full evaluation of costs and benefits needs to be made. This includes economic externalities associated with the industry. These may present as synergies between different industry sectors; for example, wildflower or fish farming may also attract tourists. They may involve environmental or social benefits that will not be realised through reliance on market incentives alone. In such situations government intervention is needed to capture the full community benefits of the new industry.\textsuperscript{107}

The Committee concludes that government will continue to have a role to play in the development of new, native-species-based industries, both to facilitate those with most promise and to ensure that they are developed in the best interests of all Victorians.

\begin{footnotes}
\item Millar, D. (1999), Rural Industries Coordinator, Department of Natural Resources and Environment, \textit{Minutes of Evidence}, 26 April 1999.
\item Godden, D (1998), ‘Growing Plants, Evolving Rights: Plant Variety Rights in Australia’, \textit{Australian Agribusiness Review}, Vol. 6, Agribusiness Association of Australia; and also
\item Nursery Industry Association of NSW, Response to the NSW National Parks and Wildlife Services’ \textit{Commercial Use of Protected and Threatened Native Plants in NSW - Draft Management Plan.}
\item The developer of a new product has a two to three year advantage over other growers who may be able to land the product on the major markets at a cheaper price than an Australian grower - because of the high transport costs due to distance to major world markets and the lower labour costs of developing countries.
\item Jones, R. (1999), the Melbourne National Flower Centre, personal communication, 29 March 1999.
\end{footnotes}
12 ibid.
15 ibid.
17 ibid.
18 ibid.
19 ibid.
20 ibid.
21 ibid.
22 ibid.
24 See chapter 5.
27 ibid., p. 69.
29 The World Tourism and Travel Council (formed in 1990) developed the Green Globe concept in 1993. This program is reviewed annually and provides a form of international accreditation to companies that show that they meet required standards of environmental commitment - Preece, N., van Oosterzee, P. and James, D. (1995), Two Way Track: Biodiversity Conservation and Ecotourism: an Investigation into Linkages, Mutual Benefits and Future Opportunities. Biodiversity Series Paper No. 5, Department of Environment, Sport and Territories, Canberra, ACT, p. 69.
30 Tourism Accreditation Board of Victoria Inc (undated). Accreditation A Commitment to Quality, Information, pamphlet produced by the Tourism Accreditation Board of Victoria, Melbourne Australia; Internet site: http://www.ttvic.com.au/ttvic/opt12.htm. Recognised accreditation programs for various sectors become part of this over-arching Tourism Accreditation. They are produced through the relevant industry associations. Programs incorporate codes of practice, compliance with regulations, assessable operational standards for the sector concerned and quality assurance.
31 Hunt, N. (1999), Secretary of the Tourism Accreditation Board of Victoria Inc., personal communication, 8 July 1999, and also Hundloe, T., Chairperson of the National Ecotourism Accreditation Program and Charters, A. (1999), Director of Planning and Destination Development, Tourism Queensland, personal communications, 11 June 1999.
32 Victorian Tourism Operators Association and the Tourism Training Board of Victoria (TTV) facilitated the establishment of the Tourism Accreditation Board of Victoria. Its membership is drawn from industry sectors, government (Tourism Victoria) and independent semi-government bodies, particularly the TTV.
33 Hunt, N. (1999), Secretary of the Tourism Accreditation Board of Victoria Inc., personal communication, 8 July 1999.
35 NEAP is also currently reviewing its program to ensure that accreditation meets the specific needs of different States - Hundloe, T. (1999), Chairperson of the National Ecotourism Accreditation Program and Charters, A. (1999), Director of Planning and Destination Development, Tourism Queensland, personal communications, 11 June 1999.
Community planning for Ecotourism: a Natural Strength for Victoria. In this book, Halls Gap is used as a case study with the aim of "making the experience in Halls Gap useful for other communities." Monash University Graduate School of Environmental Science (1997), Community planning for Ecotourism Monash University, Clayton, Victoria, p. 6.

The value of having a facilitator who can bring expertise and independence to the process is well demonstrated by the Halls Gap experience reported in Monash University Graduate School of Environmental Science (1997), Community planning for Ecotourism, Monash University, Clayton, Victoria, pp. 56-57.

Hunt, N. (1999), Executive Director, Tourism Training Victoria, personal communication, 8 July 1999.


Tourism Training Victoria is part of the Tourism Training Network. Its functions are to:

a) provide advice to Federal and State Governments and education institutions on industry training needs;

b) establish training standards consistent with national guidelines and industry’s needs;

c) co-ordinate the development and implementation of new initiatives involving industry, government and the education system;

d) develop training resources and provide advice to organisations to improve industry-based training; and

e) promote training within industry and career opportunities to new entrants.

Hunt, N. (1999), Executive Director, Tourism Training Victoria, 8 July 1999.

Particularly the TAFE system.

Information provided by Nicholas Hunt, Executive Director, Tourism Training Victoria, Level 7, 189 Flinders Lane, Melbourne, Victoria, Australia, March 1999.


Ibid., p. 11.

Ibid., p. 69.


Department of Conservation and Environment (1992), Ecotourism: a Natural Strength for Victoria, Department of Conservation and Environment, Melbourne, Victoria, p. 12.

An example of material tailored to the needs of the small community-based operator is a handbook developed by Monash University’s Graduate School of Environmental Science, Community planning for Ecotourism. In this book, Halls Gap is used as a case study with the aim of “making the experience in Halls Gap useful for other communities.” Monash University Graduate School of Environmental Science (1997), Community planning for Ecotourism Monash University, Clayton, Victoria, p. 6.

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Hunt, N. (1999), Executive Director, Tourism Training Victoria, personal communication, 8 July 1999.


Facilitating Selected Sectors

62 ibid., p. 45.
63 ibid., p. 5.
64 ibid., p. 21.
65 ibid., p. 61.
66 Various studies by the Bureau of Tourism Research; for example, Stimson, R. J., Daly, M. T., Jenkins, O., Roberts, B. H. and Ross, S. (1996), *Occasional Paper No 23: Tourism in Australia: An Overview of Trends, Issues and Prospects*, Bureau of Tourism Research, Canberra, ACT.
69 ibid., p. 5.
70 ibid., p. 5.
71 ibid., pp. 5-7.
74 ibid., pp. 133-134.
75 ibid., pp. 158-160.
77 ibid., pp. 73-77.
78 The possibility that such charges might lead to a substantial reduction in use of these areas was not considered; nor were equity issues raised, including the contribution that Victorians pay through taxes to retain these areas.
79 An example of promotion linked to conservation was observed by the Committee at Banrock Station, Kingston, South Australia. Wetland habitat restoration is being used as a promotion tool for ‘Banrock Station’ wines as well as to set aside funds for restoration works; SA study Tour, 9 March 1999.
80 See chapter 5.
82 ibid., Vic.
86 ibid., personal communication, 9 February 1999.
89 Those listed were not always shown to be significantly related to success, as indicated by the indices and statistical analyses used in the Rural Industries Development Commission’s study. Industry members claimed the factors
described were important. Lack of statistical significance could be a consequence of the small sample size of 35 industries with only 18 involved in processing, and/or the narrow definition of ‘success’.


93 Ibid., p. v-vi.


96 For example, tea-tree oil as an antiseptic

97 For example, native plants used in novel cuisine.


99 Ibid., p. vi.

100 For example, AMRAD Discovery Technologies and Robins Bush Foods inspected by the Committee 29 March 1999

101 For example, Australian Native Produce and Macro Meats, two native-species food companies, are negotiating to place their products in mainstream supermarket chains.


103 Ibid.

104 Ibid.


106 Ibid., p. 46; and also

# APPENDIX I
ABBREVIATIONS, DEFINITIONS AND GLOSSARY

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Definition</th>
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<tbody>
<tr>
<td>ANZECC</td>
<td>Australian New Zealand Environment and Conservation Council.</td>
</tr>
<tr>
<td>Aeration</td>
<td>Subjecting to air or oxygen.</td>
</tr>
<tr>
<td>Agronomics</td>
<td>The application of agronomy.</td>
</tr>
<tr>
<td>Agronomy</td>
<td>The science of managing land crops.</td>
</tr>
<tr>
<td>Alley farming</td>
<td>A farming system that involves the use of belts of trees and/or shrubs between strips (alleys) of pasture or crop. The trees and shrubs provide shelter and alternative products, and may also control soil degradation.</td>
</tr>
<tr>
<td>Amenity</td>
<td>That which helps to make a location pleasant or agreeable.</td>
</tr>
<tr>
<td>Anaerobic</td>
<td>An environment without oxygen.</td>
</tr>
<tr>
<td>Apiarist</td>
<td>A person who keeps an apiary (bee hives).</td>
</tr>
<tr>
<td>Apiculture</td>
<td>The rearing and keeping of bees.</td>
</tr>
<tr>
<td>Aquaculture</td>
<td>The cultivation or farming of marine and freshwater species in tanks or ponds or some other form of artificial habitat (the cultivation of marine species is sometimes referred to as mariculture).</td>
</tr>
<tr>
<td>Aquaria</td>
<td>Plural of aquarium.</td>
</tr>
<tr>
<td>Aquarium</td>
<td>A tank for the holding of aquatic organisms.</td>
</tr>
<tr>
<td>Arboreta</td>
<td>Plural of arboretum.</td>
</tr>
<tr>
<td>Arboretum</td>
<td>An area of land planted to different trees or shrubs used for research or enjoyment.</td>
</tr>
<tr>
<td>Arthropod</td>
<td>Segmented invertebrates, including insects, spiders and crustaceans.</td>
</tr>
<tr>
<td>Aviarist</td>
<td>A person who keeps birds in an aviary (caged birds).</td>
</tr>
<tr>
<td>Aviculturist</td>
<td>A person who rears or keeps birds.</td>
</tr>
<tr>
<td>Aviculture</td>
<td>The rearing and keeping of captive birds.</td>
</tr>
<tr>
<td>Beach-cast</td>
<td>Material that is thrown up onto a beach by wave action.</td>
</tr>
<tr>
<td>Bioassay</td>
<td>Determination of the strength of a drug by comparing its effect with that of a standard preparation.</td>
</tr>
<tr>
<td>Biochemical</td>
<td>The chemistry of living matter.</td>
</tr>
<tr>
<td>Term</td>
<td>Definition</td>
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</tr>
<tr>
<td>Biodiversity</td>
<td>The natural diversity of all life: the sum of all our native species of flora and fauna, the genetic variation within them, their habitats, and the ecosystems of which they are an integral part.</td>
</tr>
<tr>
<td>Bioprospecting</td>
<td>Screening of extracts from living organisms for compounds that are of value to humans; for example by benefiting human health, crop or animal production.</td>
</tr>
<tr>
<td>Bioremediation</td>
<td>The use of micro-organisms or active organic chemicals such as enzymes to break down environmental contaminants such as insecticides in soil.</td>
</tr>
<tr>
<td>Biota</td>
<td>The total animal and plant life, including micro-organisms, in a region or location at a particular time.</td>
</tr>
<tr>
<td>Bushfoods</td>
<td>Foods derived from native Australian plants, often, but not necessarily, identified by Aboriginal people as suitable for human consumption.</td>
</tr>
<tr>
<td>Captive breeding</td>
<td>Reproduction of an organism, usually an animal, whilst it is in captivity.</td>
</tr>
<tr>
<td>Carrying capacity</td>
<td>The size of population or amount of use that a specified area can sustain indefinitely without suffering ecological degradation such as damage to vegetation, soil erosion, altered animal behaviour or water pollution. The ‘use’ must be defined in terms of both type of use (such as bush walking; farming emus) and how it is managed (for example, walking confined to formed paths; emus provided with supplementary feed) for the term ‘carrying capacity’ to be meaningful.</td>
</tr>
<tr>
<td>Catchment Management Authority</td>
<td>Statutory bodies formed under the Catchment and Land Protection Act 1994, with a responsibility to advise the government on land and water resource management, to oversee the preparation and implementation of regional catchment management strategies and to promote sustainable management.</td>
</tr>
<tr>
<td>Caveat</td>
<td>A notice of caution or limitation.</td>
</tr>
<tr>
<td>COAG</td>
<td>Council of Australian Governments.</td>
</tr>
<tr>
<td>Coelenterates</td>
<td>A group of mostly marine animals that includes jellyfish, anemones, and corals.</td>
</tr>
<tr>
<td><strong>Commercial utilisation</strong></td>
<td>Utilisation that involves the collection, harvesting, processing and preparation for sale of native flora and fauna and of products derived from these. The expression can be used interchangeably with the term ‘commercial use’.</td>
</tr>
<tr>
<td><strong>Community</strong></td>
<td>All the populations of plants and animals in a particular area at a specified time. Sometimes the definition is restricted, as, for example, ‘animal community’.</td>
</tr>
<tr>
<td><strong>Conservation</strong></td>
<td>The planned management and use of (natural) resources to provide present benefit without compromising future benefits.</td>
</tr>
<tr>
<td><strong>Conservationist</strong></td>
<td>One who advocates or promotes conservation, especially of the natural resources of a country.</td>
</tr>
<tr>
<td><strong>Consumptive use</strong></td>
<td>Use that involves the permanent removal by humans of organisms or their products from a population or ecosystem; for example hunting, egg gathering, fishing.</td>
</tr>
<tr>
<td><strong>‘Controlled’ wildlife</strong></td>
<td>Any kind of taxon of wildlife declared to be so by an order of the Governor in Council.</td>
</tr>
<tr>
<td><strong>Coppicing</strong></td>
<td>The practice of cutting through the trunk of a tree or shrub close to the ground so that, with species that have basal buds, several new trunks will grow in place of the one removed.</td>
</tr>
<tr>
<td><strong>Cost Benefit Analysis</strong></td>
<td>A technique used to compare alternative courses of action by assigning dollar values to all benefits and costs associated with the actions.</td>
</tr>
<tr>
<td><strong>Crustacean</strong></td>
<td>A class of arthropods, including the lobsters, yabbies, prawns, crabs, barnacles and slaters; commonly having the body covered with a hard shell or crust.</td>
</tr>
<tr>
<td><strong>CSIRO</strong></td>
<td>Commonwealth Scientific and Industrial Research Organisation.</td>
</tr>
<tr>
<td><strong>Cultivar</strong></td>
<td>A unique variety of cultivated plants produced by deliberate breeding.</td>
</tr>
<tr>
<td><strong>Degradation</strong></td>
<td>The diminution of the productive capacity or quality of land, water or other (natural) resources through processes such as soil erosion, pollution or reduction in biodiversity.</td>
</tr>
<tr>
<td><strong>Detritus</strong></td>
<td>Decaying organic matter.</td>
</tr>
<tr>
<td><strong>Director-General</strong></td>
<td>Unless otherwise stated, the (successor position) Secretary of the Department of Natural Resources and Environment (the body corporate established by Part 2 of the Natural Resources and Environment Act 1987).</td>
</tr>
<tr>
<td><strong>DNRE</strong></td>
<td>Department of Natural Resources and Environment.</td>
</tr>
<tr>
<td>Term</td>
<td>Definition</td>
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</tr>
<tr>
<td>Echinoderm</td>
<td>Marine animals including sea lilies, starfishes, brittle stars and sea-cucumbers.</td>
</tr>
<tr>
<td>Ecologically Sustainable Development</td>
<td>Development that improves the total quality of life, both now and in the future, in a way that maintains the ecological processes on which life depends.</td>
</tr>
<tr>
<td>Ecology</td>
<td>The branch of science which studies the relationships between plants and animals (including micro-organisms) and their non-living environment.</td>
</tr>
<tr>
<td>Ecosystem</td>
<td>A community of organisms, interacting with one another, plus the environment in which they live, and with which they also interact.</td>
</tr>
<tr>
<td>Ecotourism</td>
<td>Nature-based tourism that includes an educational component and is managed to be sustainable.</td>
</tr>
<tr>
<td>EIS</td>
<td>Environmental Impact Statement. A generic term for an administrative process that requires the explicit consideration of potential environmental impacts of proposed developments. Note that under Victorian legislation, EIS's are known as Environmental Effects Statements (Environment Effects Act 1978).</td>
</tr>
<tr>
<td>Elver</td>
<td>A young, immature eel.</td>
</tr>
<tr>
<td>‘Endangered’ wildlife</td>
<td>Any wildlife declared to be so by proclamation of the Governor in Council under section 47B(1) of the Wildlife Act 1975.</td>
</tr>
<tr>
<td>Endemic species</td>
<td>An organism which is native to a particular place or region.</td>
</tr>
<tr>
<td>ENRC</td>
<td>Environment and Natural Resources Committee.</td>
</tr>
<tr>
<td>ESD</td>
<td>Ecologically Sustainable Development.</td>
</tr>
<tr>
<td>Ethnobotany</td>
<td>The study of plants in relation to their traditional or cultural use.</td>
</tr>
<tr>
<td>Externality</td>
<td>An economic term used to refer to costs and benefits which are external to the market process; that is they affect a third part (or parties) who are not involved in the contract of sale/purchase of goods and services. Examples are improved water quality in rivers that results when farmers control soil erosion and loss of amenity suffered by the community when oil spills kill wildlife.</td>
</tr>
<tr>
<td>Farm-gate Production</td>
<td>Production, or the value of production as it leaves the farm; that is before transport or off-farm processing occurs.</td>
</tr>
<tr>
<td>Farming of wildlife</td>
<td>The breeding of wildlife in an enclosed environment, or the cultivation of native plants in nurseries.</td>
</tr>
<tr>
<td>Fauna</td>
<td>As defined in the Flora and Fauna Guarantee Act 1988, any animal life that is indigenous to Victoria and includes fish, but not humans.</td>
</tr>
<tr>
<td>FECA</td>
<td>Flower Export Council of Australia.</td>
</tr>
</tbody>
</table>
### Abbreviations, Definitions and Glossary

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<thead>
<tr>
<th>Term</th>
<th>Definition</th>
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<tbody>
<tr>
<td>Fecundity</td>
<td>The capacity, especially in females, of producing young in great numbers. 15</td>
</tr>
<tr>
<td>FIAA</td>
<td>Flower Industry Association of Australia</td>
</tr>
<tr>
<td>Finfish</td>
<td>Fish with fins, generally taken to be the bony fish (of the class Osteichthyes), and excluding cartilaginous fish, molluscs, crustaceans, etc.</td>
</tr>
<tr>
<td>'Fish'</td>
<td>As defined in the Fisheries Act 1995, ie:</td>
</tr>
<tr>
<td></td>
<td>a) all species of vertebrate aquatic fauna other than mammals, reptiles, birds and amphibians (that is bony fish and cartilaginous fish);</td>
</tr>
<tr>
<td></td>
<td>b) sharks, rays, lampreys and other cartilaginous fish (which are, in fact, vertebrates);</td>
</tr>
<tr>
<td></td>
<td>c) oysters and other aquatic molluscs (including cephalopods such as cuttlefish);</td>
</tr>
<tr>
<td></td>
<td>d) crustaceans (for example crabs and barnacles);</td>
</tr>
<tr>
<td></td>
<td>e) echinoderms (such as star fishes and sea urchins); and any other species of aquatic invertebrates declared to be fish (to date, marine polychaete worms and jellyfish).</td>
</tr>
<tr>
<td>'Flora'</td>
<td>As defined in the Flora and Fauna Guarantee Act 1988, any plant life which is indigenous to Victoria, including trees. 16</td>
</tr>
<tr>
<td>Floriculture</td>
<td>The development and production of cut flowers for sale.</td>
</tr>
<tr>
<td>'Game'</td>
<td>Any kind or species of wildlife declared to be game under the Wildlife Act 1975, including deer and several species of native birds. 17</td>
</tr>
<tr>
<td>Genetic engineering</td>
<td>The alteration of the genetic make-up of an individual or population through the artificial introduction of new genetic material, often from a different species.</td>
</tr>
<tr>
<td>Germ plasm</td>
<td>The protoplasm of the germ cells containing the units of heredity. 18</td>
</tr>
<tr>
<td>GSAC</td>
<td>Garden State Advisory Council.</td>
</tr>
<tr>
<td>Gymnosperms</td>
<td>A group of plants that includes conifers (pine trees).</td>
</tr>
<tr>
<td>Habitat</td>
<td>The environment where a given animal or plant population naturally lives or grows.</td>
</tr>
<tr>
<td>Harvesting</td>
<td>The removal of wildlife, or some part of it, from its wild state. It may involve collecting eggs or plant parts and live capture of animals, as well as the taking of whole, dead organisms.</td>
</tr>
<tr>
<td>Herbivore</td>
<td>An animal which lives by consuming plants</td>
</tr>
<tr>
<td>Herpetologist</td>
<td>A person who breeds, keeps and studies reptiles and amphibians.</td>
</tr>
<tr>
<td>Horticulture</td>
<td>The propagation of native plants in nurseries for some commercial use. 19</td>
</tr>
</tbody>
</table>

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15 The capacity, especially in females, of producing young in great numbers.  
16 As defined in the Flora and Fauna Guarantee Act 1988, any plant life which is indigenous to Victoria, including trees.  
17 Any kind or species of wildlife declared to be game under the Wildlife Act 1975, including deer and several species of native birds.  
18 The protoplasm of the germ cells containing the units of heredity.  
19 The propagation of native plants in nurseries for some commercial use.
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</thead>
<tbody>
<tr>
<td>‘Hunt’</td>
<td>As defined in the Wildlife Act (1975), includes to pursue, trail, stalk, search for, or to drive out, an animal.</td>
</tr>
<tr>
<td>Hunting</td>
<td>A recreational activity which involves those who hunt and can include commercial ventures for tourists who wish to hunt animals.</td>
</tr>
<tr>
<td>Husbandry</td>
<td>The care of animals in a farmed situation with attention to both their welfare and productive capacity</td>
</tr>
<tr>
<td>Imbibition</td>
<td>The act of absorbing a liquid into an organism.</td>
</tr>
<tr>
<td>Indigenous species</td>
<td>A species originating in a particular region or country.</td>
</tr>
<tr>
<td>Intellectual Property Rights</td>
<td>Rights arise from laws that provide protection of creative effort. Such rights are usually in the form of copyright, patents or trademarks established under Commonwealth law. Monopoly rights to exploit property under such laws only last for a defined period.</td>
</tr>
<tr>
<td>Inter-generational</td>
<td>Between generations; particularly between the present human community and those that are as-yet children or unborn.</td>
</tr>
<tr>
<td>Inter-sectorial</td>
<td>Between different sectors of the community; for example between rural and urban communities or between those who provide and those who use a resource.</td>
</tr>
<tr>
<td>Invertebrate</td>
<td>An animal without a backbone, such as an insect, crustacean, mollusc or worm.</td>
</tr>
<tr>
<td>ISO</td>
<td>International Standards Organisation.</td>
</tr>
<tr>
<td>‘Keep’</td>
<td>In relation to the Flora and Fauna Guarantee Act 1988: to have charge or possession of, in captivity or in a domesticated state.</td>
</tr>
<tr>
<td>Mariculture</td>
<td>The farming of saltwater species in cages, pots or rocks.</td>
</tr>
<tr>
<td>Market</td>
<td>In economic terms, a market exists where a buyer and seller agree to trade. For a trade to occur both buyer and seller must be satisfied with the price, form and quality of the product.</td>
</tr>
<tr>
<td>Microclimate</td>
<td>The climate of the very small or confined area that is immediately relevant to a particular organism at a given point in time.</td>
</tr>
<tr>
<td>Micro-organisms</td>
<td>A microscopic organism (animal or vegetable), including bacteria and microscopic algae.</td>
</tr>
<tr>
<td>Mono-crop</td>
<td>A crop which consists of only one species</td>
</tr>
<tr>
<td>Moratorium</td>
<td>A legal authorisation to delay payment of money due, as in an emergency. The term is often extended to include a pause in any exploitative activity - for example, the harvesting of a wild species</td>
</tr>
<tr>
<td><strong>Abbreviation</strong></td>
<td><strong>Definition</strong></td>
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<tr>
<td>National Competition Policy</td>
<td>A national policy under which all Australian governments must review any barriers to competition in the provision of public infrastructure and services.</td>
</tr>
<tr>
<td>Native fauna and flora</td>
<td>Taken to be all animals and plants established in Australia prior to 1788.</td>
</tr>
<tr>
<td>Nature-based tourism</td>
<td>Tourist activities that have as key components the enjoyment of natural features of the land.</td>
</tr>
<tr>
<td>Non-consumptive use</td>
<td>Any activity by which humans derive a benefit from a population without permanently removing organisms or their products from a population or ecosystem.</td>
</tr>
<tr>
<td>Non-vascular plants</td>
<td>Plants that do not have a clearly developed vascular system for the transport of water and nutrients within the plant; for example mosses and algae.</td>
</tr>
<tr>
<td>'Notable' wildlife</td>
<td>Any wildlife declared to be so by proclamation of the Governor in Council under section 47B(2) of the Wildlife Act 1975.</td>
</tr>
<tr>
<td>Omnivorous</td>
<td>Eating all kinds of foods, including both plants and other animals.</td>
</tr>
<tr>
<td>Organism</td>
<td>Any form of animal or plant life, including micro-organisms.</td>
</tr>
<tr>
<td>Overstorey</td>
<td>The tallest plants in a community of plants of differing heights. The overstory plants consequently receive the most light and overshadow plants below them.</td>
</tr>
<tr>
<td>Palaeobotany</td>
<td>The branch of palaeontology (the study of fossils) that deals with fossil plants.</td>
</tr>
<tr>
<td>Pathogens</td>
<td>A disease-producing organism.</td>
</tr>
<tr>
<td>PBR</td>
<td>Plant Breeders’ Right – see below.</td>
</tr>
<tr>
<td>Perennial</td>
<td>Having a life cycle lasting more than two years.</td>
</tr>
<tr>
<td>Permaculture</td>
<td>A system of horticulture in which perennial (and sometimes self-seeding) species are grown together to provide a continuous production of food without the need for regular sowing or planting.</td>
</tr>
<tr>
<td>Pest species</td>
<td>‘Noxious weeds’ and ‘pest animals’ declared under the Catchment and Land Protection Act 1994.</td>
</tr>
<tr>
<td>Phytophthera</td>
<td>A group of fungi that is capable of producing root disease in a number of native plant species. This leads to progressive death of tops or ‘die-back’. Susceptible species include many species of Banksia.</td>
</tr>
<tr>
<td>Term</td>
<td>Definition</td>
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</tr>
<tr>
<td>Plant Breeders' Right</td>
<td>An exclusive right given over registered varieties for a period of 20 or 25 years provided under the Plant Breeders' Rights Act 1994 to the breeders of new plant varieties.</td>
</tr>
<tr>
<td>Plant variety</td>
<td>A group of plants of one species that have substantially uniform, genetically determined characteristics that are distinguishable from other plants of the same species.</td>
</tr>
<tr>
<td>Precautionary Principle</td>
<td>This concept states that “where there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation”.</td>
</tr>
<tr>
<td>Property Rights</td>
<td>The common law rights of the legal owners of property to use, protect and transfer that property to the exclusion of others. Vegetation on land is traditionally considered as a ‘fixed’ item and thus ‘owned’ by the landowner. Native fauna is not a ‘fixed’ item and thus not generally subject to a property right (although the landowner may enjoy a common law right to take into possession and utilise any animal whilst on or above their land).</td>
</tr>
<tr>
<td>Proponent</td>
<td>One who puts forward and advocates a proposition or proposal.</td>
</tr>
<tr>
<td>‘Protected flora’</td>
<td>Either (a) any flora declared to be protected by an order of the Governor in Council, or (b) any flora which is part, or member, of a taxon or community listed in Schedule 2 of the Flora and Fauna Guarantee Act 1988.</td>
</tr>
<tr>
<td>‘Protected wildlife’</td>
<td>All wildlife other than those kinds of taxon which is a pest animal within the meaning of the Catchment and Land Protection Act 1994 or the Governor in Council declares to be unprotected wildlife or are specified by order of the Governor in Council under section 7A of the Wildlife Act 1975.</td>
</tr>
<tr>
<td>Ranching</td>
<td>A system of animal production in which animals or their eggs are taken from the wild to be raised in a controlled environment for subsequent production of consumable items, or for use in live-animal displays.</td>
</tr>
<tr>
<td>Recombinant DNA</td>
<td>DNA that has been recombined using constituents from other sources. This is the essential element of genetic engineering.</td>
</tr>
<tr>
<td>Regeneration</td>
<td>In relation to plant communities, the restoration of a cover of local native plants in order to restore a natural habitat and protect soil from erosion and (possibly) salinity.</td>
</tr>
<tr>
<td>RIRDC</td>
<td>Rural Industries Research and Development Corporation.</td>
</tr>
<tr>
<td><strong>Salinity (of soil – human induced)</strong></td>
<td>Relates to a level of soluble salts in the soil that is sufficient to impact adversely on the growth of non-salt tolerant plants, and which has developed as a result of land clearing (dryland salinity) or irrigation (irrigation-induced salinity).</td>
</tr>
<tr>
<td><strong>Saprophyte</strong></td>
<td>A plant or micro-organism that obtains its nutrients from dead or decaying organic matter.36</td>
</tr>
<tr>
<td><strong>Sclerophyll</strong></td>
<td>Plants typically found in areas of general or periodic low rainfall, and which have tough leathery leaves that help to reduce water loss.</td>
</tr>
<tr>
<td>‘Secretary’</td>
<td>As referred to in the Fisheries Act 1995, the Flora and Fauna Guarantee Act 1988, the National Parks Act 1975 and the Wildlife Act 1975 means the Secretary of the Department of Natural Resources and the Environment.</td>
</tr>
<tr>
<td><strong>Self-sufficient</strong></td>
<td>Wildlife that can survive as an independent entity; not an animal that cannot feed itself, a bird that is too young to fly, a non-weaned mammal, an animal that is injured or diseased, an egg or some other similarly dependent entity. The term is given legal definition under the Wildlife Regulations 1992, Regulation 12(1)a.37</td>
</tr>
<tr>
<td>‘Sell’</td>
<td>As used in the Wildlife Act 1975, includes barter or exchange and also agreeing to sell; or offering or exposing for sale; or keeping or having in possession for sale; or sending, forwarding, delivering or receiving for, or on, sale; or authorising, directing, causing, suffering, permitting or attempting any of the above acts or things.38</td>
</tr>
<tr>
<td><strong>Semi-arid</strong></td>
<td>A region in which a deficiency in rainfall is the dominant factor in plant growth but which is not as dry as ‘arid’. In Australia this is taken broadly to be land with precipitation between approximately 250 mm and 450 mm per year, but reliability and the season in which rain falls, and temperature regimes also influence the boundaries of the region.</td>
</tr>
<tr>
<td><strong>Senate Inquiry</strong></td>
<td>The Inquiry into the Commercial Utilisation of Australian Wildlife conducted by the Federal Senate Rural and Regional Affairs and Transport References Committee, which tabled its report in June 1998.39</td>
</tr>
<tr>
<td><strong>In situ/ex situ</strong></td>
<td>In situ - located in its original situation (position). Ex situ - located outside its normal situation (position).</td>
</tr>
<tr>
<td><strong>State Wildlife Reserves</strong></td>
<td>Lands under the management and control of the Secretary of the Department of Natural Resources and Environment. These Reserves can be reclassified, for example as State Game Reserves.40</td>
</tr>
<tr>
<td><strong>Stewardship</strong></td>
<td>To act as one entrusted with the good management of another’s property; leaving the land in a better condition for future generations.41</td>
</tr>
<tr>
<td>Substrate</td>
<td>Medium from which an organism can obtain nutrients and on which it can grow.</td>
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</tr>
<tr>
<td>Super-abundant species</td>
<td>Perception and definition of 'super-abundance' varies. The perception of a species as 'super-abundant' often arises where it is causing damage to crops or threatening natural ecosystems. A species may be defined as super-abundant where it has a distribution and/or abundance that exceeds that (assumed or calculated) at the time of settlement by Europeans. 42</td>
</tr>
<tr>
<td>Sustainability - (ecological)</td>
<td>Is concerned with the protection of biological diversity and maintenance of the ecological processes on which life depends. 43</td>
</tr>
<tr>
<td>Sustainable development</td>
<td>Refer to ESD.</td>
</tr>
<tr>
<td>Sustainable use</td>
<td>An activity by which humans obtain some benefit without reducing the future potential or impairing the long-term viability of the species used or their ecosystem. 44</td>
</tr>
<tr>
<td>Symbiotic relationship</td>
<td>Is usually taken to refer to a mutually beneficial relationship between two species, but less often refers to a relationship where only one species benefits. 45</td>
</tr>
<tr>
<td>Synergism</td>
<td>The joint action of two substances, as drugs, which increase each other's effectiveness when taken together.</td>
</tr>
<tr>
<td>‘Take’</td>
<td>In relation to the Flora and Fauna Guarantee Act 1988 section 3(1), means to kill, injure or disturb flora and fauna or to collect flora, though in relation to the Wildlife Regulations 1992 regulation 5 and the Fisheries Act 1995 it can also mean to gain possession or control of wildlife or fish by any means. 46</td>
</tr>
<tr>
<td>Taxa (singular taxon)</td>
<td>A taxonomic group of any rank into which organisms are categorised. 49 That is, the term could relate to individual species or sub-species, but likewise could refer to a larger grouping of species - such as genus (for example eucalypts) or a family (for example tortoises).</td>
</tr>
<tr>
<td>Taxonomic</td>
<td>That department of science, or of a particular science, which deals with classification, in the case of plants and animals into taxa such as families, genera and species. 50</td>
</tr>
<tr>
<td>‘Threatened’</td>
<td>Taxa and communities included in the listing of taxa and communities which are threatened with extinction under the Flora and Fauna Guarantee Act 1988.</td>
</tr>
<tr>
<td>Toxicology</td>
<td>The science of poisons, their effects, antidotes and detection. 51</td>
</tr>
<tr>
<td><strong>'Trade'</strong></td>
<td>'To buy; to agree to receive or accept under an agreement to buy; to acquire by barter; to sell; to agree to offer or expose for sale or to keep and have in one's possession for sale; to dispose of by barter for the purposes of gain or advancement or to suffer or cause any of that above behaviour.'</td>
</tr>
<tr>
<td>---</td>
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</tr>
<tr>
<td><strong>Translocation</strong></td>
<td>'The introduction of individuals of a species or variety of a species into a locality outside the natural range of the species or variety of the species.'</td>
</tr>
<tr>
<td><strong>Tube-stock</strong></td>
<td>'Small seedlings with roots and soil contained within a plastic or plywood tube.'</td>
</tr>
<tr>
<td><strong>Turbidity</strong></td>
<td>'Refers to the condition of water that is opaque due to suspended matter, generally clay particles, within the water column.'</td>
</tr>
<tr>
<td><strong>Understorey</strong></td>
<td>'Lower-level plant growth in forests or woodland, especially the plants and seedlings overshadowed by the forest canopy.'</td>
</tr>
<tr>
<td><strong>'Unprotected wildlife'</strong></td>
<td>'Any protected wildlife declared to be ‘unprotected’ in an area of Victoria by an order of the Governor in Council under section 7A of the Wildlife Act 1975.'</td>
</tr>
<tr>
<td><strong>User Pays</strong></td>
<td>'The practice whereby the user of any resource is charged the full cost of supplying the resource, product or service being used.'</td>
</tr>
<tr>
<td><strong>Utilisation</strong></td>
<td>'Any activity by which humans derive a benefit or some useful purpose, and includes activities which do not necessarily involve the adaptation of, or change in, the form of the wildlife. This definition includes commercial and non-commercial utilisation and consumptive and non-consumptive use.'</td>
</tr>
<tr>
<td><strong>Vascular plants</strong></td>
<td>'A plant with a distinct vascular system in which water and nutrients are conveyed throughout the plant, particularly flowering plants and conifers. Ferns have only a rudimentary vascular system.'</td>
</tr>
<tr>
<td><strong>Vertebrates</strong></td>
<td>'Animals with a backbone and spinal cord.'</td>
</tr>
<tr>
<td><strong>Vertically-integrated (industry)</strong></td>
<td>'An industry in which production, processing and marketing are undertaken by the one company or integrated through close associations of more than one company.'</td>
</tr>
<tr>
<td><strong>Victorian native fauna and flora</strong></td>
<td>'Animals and plants established in Victoria prior to 1788.'</td>
</tr>
<tr>
<td><strong>Victorian species</strong></td>
<td>'Any species found naturally in the wild in Victoria, including species that also occur naturally in other parts of Australia or, possibly, in other parts of the world.'</td>
</tr>
<tr>
<td>Term</td>
<td>Definition</td>
</tr>
<tr>
<td>-------------</td>
<td>--------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>‘Whale’</td>
<td>Within the context of Part X of the Wildlife Act 1975, includes any member of the sub-order Mysteceti or the sub-order Odontoceti of the order Cetacea (that is all dolphins and whales found in Victoria) that are within the limits of waters within the state of Victoria or in Australian territorial waters adjacent to those Victorian waters.</td>
</tr>
<tr>
<td>‘Wild’</td>
<td>The independent, unpossessed or natural state and not in an intentionally cultivated, captive or domesticated state.</td>
</tr>
<tr>
<td>Wild harvest</td>
<td>The taking of plants and animals directly from the wild.</td>
</tr>
<tr>
<td>Wild population</td>
<td>A population of any animal which is living and breeding in the wild; that is, not subject to human cultivation, confinement or husbandry.</td>
</tr>
<tr>
<td>‘Wildlife’</td>
<td>Native animals living in their natural habitat, defined in the Wildlife Act 1975 as: (1) any animal of a vertebrate taxon other than mankind which is indigenous to Australia whether or not it occurs elsewhere; (2) all kinds of deer, non-indigenous quail, pheasants and partridges, any other taxon declared by the Governor in Council to be so; (3) any taxon of terrestrial invertebrate animal listed under the Flora and Flora Guarantee Act 1988; (4) hybrids of (1) &amp; (2); (5) except where stated in an Order, it includes animals or taxon bred in captivity or confinement but does not include whales and (6) wildlife in any form (alive, dead, processed, preserved), any part of their body including their feathers and their eggs.</td>
</tr>
<tr>
<td>‘Wildlife park’</td>
<td>Under the Wildlife Act 1975, any place where a collection of wildlife is kept or retained for public viewing, entertainment or amusement.</td>
</tr>
</tbody>
</table>

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2. DNRE (a), p2.
5. *Wildlife Act 1975* s. 3(1).
14 Flora and Fauna Guarantee Act 1988 s. 3(1).
16 Flora and Fauna Guarantee Act 1988 s. 3(1).
17 Wildlife Act 1975 s. 3(1).
20 Wildlife Act 1975 s. 3(1).
22 Flora and Fauna Guarantee Act 1988 s. 3(1).
26 Wildlife Act 1975 s. 15(3).
27 Wildlife Act 1975 s. 3(1).
32 Flora and Fauna Guarantee Act 1988 s. 3(1).
33 Flora and Fauna Guarantee Act 1988 s. 3(1).
34 Flora and Fauna Guarantee Act 1988 s. 3(1).
37 Wildlife Regulations 1992 r. 12(1)(a).
38 Wildlife Act 1975 s. 3(1).
40 Wildlife Act 1975 s. 15.
47 Wildlife Regulations 1992 r. 5.
48 Fisheries Act 1995 s. 4(1).
52 Flora and Fauna Guarantee Act 1988 s. 3(1).
54 Wildlife Act 1975 s. 75(2).
55 Flora and Fauna Guarantee Act 1988 s. 3(1); Wildlife Act 1975 s. 3(1).
56 Wildlife Act 1975 s. 71(1).
APPENDIX II
THE SENATE INQUIRY

An Inquiry into the Commercial Utilisation of Australian Native Wildlife was undertaken by the Rural and Regional Affairs and Transport References Committee, a committee of the Senate of the Parliament of the Commonwealth of Australia. The report of the Inquiry was published in June 1998.

Terms of Reference
The reference from the Senate required the Senate Committee to undertake an Inquiry into:
   a) the potential impact which commercial utilisation of native wildlife might have on the Australian environment;
   b) the current and future economic viability of these commercial activities; and
   c) the adequacy of existing Federal Government regulations and controls to ensure biodiversity of any native species commercially utilised.

Principles for the Commercial Utilisation of Wildlife Principles
A wide range of suggested principles to be applied to the commercial utilisation of wildlife were made in the evidence submitted to the Senate Inquiry. The Senate Committee, in its report of the Inquiry, concluded that the following principles were important:
   a) there should be broad legislative frameworks within which proposals for the commercial use of wildlife can be approved, regulated and administered. Regulatory structures should be consistent across legislatures and allow industry to operate at maximum efficiency;
   b) the principle of ecologically sustainable development should underpin any assessment of commercial use of wildlife and, before any approval is given for commercial utilisation of wildlife, it should be proven beyond reasonable doubt that such use will be ecologically sustainable;
   c) in granting approval for proposals to use wildlife on a commercial basis, governments should take into account the precautionary principle and the principle of inter-generational equity;
   d) proposals for the commercial use of wildlife need to be identified and managed on a case-by-case basis. The conditions of commercialisation that are appropriate to each animal must be determined by the biology of the species, a basic knowledge of which should be ascertained prior to commencement of the proposal. Information about the species should include its distribution, abundance and demography. However, lack of detailed information about a species should not be used as an argument against the commencement of commercialisation on a trial basis;
   e) the risk of over-harvesting should be low and legal harvesting should be set at a level well below the scientifically calculated off-take rate. Where a legitimate increase in quota is indicated, it should still incorporate a safety margin. There should be a low risk of 'by-catch' of non-target species;
   f) the management of commercial use of wildlife must be adaptive so that managers can respond to changing circumstances;
g) the management of commercial use of wildlife must include monitoring of population levels and demography; large proposals must include provision for independent monitoring;

h) the management of commercial use of wildlife must include monitoring of environmental impacts through an EIS procedure. Small, diffuse, commercial harvesting programs must be monitored by a centralised agency to allow assessment of total impact across each State or across Australia;

i) the risk of detrimental environmental impact should be matched to the requirement for conservation benefit. Commercial utilisation of wildlife should never be a threat to the conservation status of a species or population;

j) decision making, public accountability and monitoring processes must be transparent and accessible;

k) regulations should be in place to ensure that the treatment of animals is humane at all times and that all wildlife programs endeavour to achieve the highest standard possible for animal welfare; as far as possible, all suffering and cruelty should be eliminated;

l) it is undesirable to remove adult birds from the wild for any purpose other than to provide breeding stock, either for a closed-cycle breeding program or to breed numbers of rare or endangered species;

m) governments should make efforts to ensure that there are no unnecessary economic, legal or administrative barriers to inhibit wildlife from realising its competitive advantage as a land use;

n) in general, the principles of 'user pays' and 'cost recovery' should be applied in the administration of wildlife industries but, in calculating these costs, community benefits should also be taken into account; and

o) wherever possible there should be local community participation in, and benefit from, commercialisation of wildlife.¹

Recommendations of the Senate Inquiry

The Senate Inquiry made 12 recommendations. The key elements of each recommendation are outlined below:

Recommendation 1

That the Federal Government investigate the possibility of an experimental management trial [of replacing traditional farmed animals with native wildlife in marginal agriculture lands], preferably in the rangelands region of Australia. ... [with] State government officials ... [and others].

Recommendation 2

That the Rural and Regional Affairs and Transport References Committee review the effectiveness of programs related to feral animal control in two years' time.

Recommendation 3

That the [Federal] Government monitor the environmental, social and economic impacts of commercial utilisation of wildlife so that a balance sheet can be constructed to assess the full impact of wildlife industries on the Australian economy.

Recommendation 4

That the Federal Government investigate ways in which private-sector investment in biodiversity conservation can be supported and encouraged.
Recommendation 5
That State and Federal Governments together review all administrative procedures relating to commercial utilisation of wildlife in Australia with a view to increasing their efficiency so as to ensure that there are no unnecessary hindrances to industry.

Recommendation 6
[That] Federal and State Governments review wildlife regulations with a view to facilitating the work of professional and amateur scientists so that they can actively contribute to biodiversity conservation.

Recommendation 7
That codes of practice relating to wildlife industries should:
(1) be in place prior to approval being given;
(2) have a clear connection between licensing conditions and compliance with a code of practice;
(3) be consistent between states; and
(4) be consistent between codes.

Recommendation 8
That the [Federal] Government include in that review [of environmental legislation] consideration of other policy options for wildlife protection.

Recommendation 9
That the [Federal] Government give priority to resolving problems relating to the sale and export of coral and shells so as to assist industry.

Recommendation 10
[That] a remote Aboriginal community be invited to carry out a trial survey of the levels of subsistence wildlife use and its impact on biodiversity ...

Recommendation 11
That Aboriginal people should be consulted where commercial opportunities are identified on lands where there are communities which have strong traditional links to those lands.

Recommendation 12
That the Federal Government give greater attention to [the importance of intellectual property rights of Aboriginal people in relation to the use of wildlife] ...

Findings of The Senate Inquiry
The Senate Inquiry report also highlighted a number of key findings that are summarised in the relevant sections of the Committee's Discussion Paper as well as this Report.

Federal Government Response to the Senate Inquiry
The Senate Inquiry report has been tabled in the Parliament of the Commonwealth of Australia. The Government of the day is required to provide a response to the Committee's findings. As at 30 June 1999, a response had not been made.

Comparison of Existing Victorian Legislation with the Recommendations of the Senate Inquiry
In comparing the Senate Inquiry's recommendations against the Victorian legislation on native flora and fauna, the current position appears to be as follows:
a) the subject matter of only four (Recommendations 3, 5, 7 and 8) of the 12 recommendations are really dealt with in any way by the Victorian legislation consulted for this Report;

b) with regard to Recommendation 3, which deals with monitoring economic and other aspects of commercial utilisation of wildlife, the Joint Authority of Commonwealth and State Fisheries Management and the Victorian Minister responsible for fisheries have the power to look at various economic and efficiency aspects of fisheries policy, but otherwise there is no legislative basis for monitoring these economic aspects in current Victorian legislation;

c) Recommendation 5 deals with increasing economic efficiency to ensure no hindrances to industry and the Victorian legislators have shown a willingness to remove strict prohibitions on the use of native wildlife by allowing the licensing of usage of such wildlife and even the use of listed endangered species under provisions of existing legislation;

d) Recommendation 7 deals with various aspects of uniformity in codes of practice and their use in licensing procedures. Some Victorian wildlife legislation does provide the power to make codes of practice but to date there are no specific elements of this Recommendation in place; and

e) Recommendation 8 is similar to Recommendation 5 and, as stated above, Victoria has used written authorisation as a means of avoiding a regime of strict prohibition on the use of native wildlife.

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2 *Fisheries Act 1995* (Vic) ss 21(1)(b) & (2)(b) & 28(6)(g).
## APPENDIX III
### ERRATA TO THE DISCUSSION PAPER

A small number of errors in the material included in the Inquiry Discussion Paper\(^1\) have been brought to the attention of the Committee.

<table>
<thead>
<tr>
<th>Paragraph reference</th>
<th>Amended text</th>
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<tbody>
<tr>
<td>4.12</td>
<td>… c) Bush Heritage Trust Program - a private non-profit company that uses donations to acquire lands which it manages for nature conservation purposes (although it operates in Victoria, none of its properties are currently in Victoria). ...</td>
</tr>
<tr>
<td>9.36</td>
<td>In Victoria, tree ferns (Dicksonia antartica) are harvested under licence from State forests and private logging operations for domestic and export markets. All harvested plants must be tagged. Additional plants are imported from Tasmania.</td>
</tr>
</tbody>
</table>

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# APPENDIX IV
## LIST OF WRITTEN SUBMISSIONS

<table>
<thead>
<tr>
<th>Submission No.</th>
<th>Name</th>
<th>Organisation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Rev J. Klement</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Mr Peter Goegan</td>
<td>Maroondah City Council</td>
</tr>
<tr>
<td>3</td>
<td>Mr Paul McGowan</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Mr Edmund Carew</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Dr W M Ellis</td>
<td>South Gippsland Conservation Society</td>
</tr>
<tr>
<td>6</td>
<td>Mr John Koehn</td>
<td>Freshwater Ecology, Arthur Rylah Institute for Environmental Research</td>
</tr>
<tr>
<td>7</td>
<td>Dr Beth Gott</td>
<td>Department of Biological Sciences, Monash University</td>
</tr>
<tr>
<td>8</td>
<td>Ms Diane Francis</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Mr Greg Hocking</td>
<td>Parks and Wildlife Service, Department of Environment and Land Management (Tasmania)</td>
</tr>
<tr>
<td>10</td>
<td>Mr Ray Page</td>
<td>VRFish</td>
</tr>
<tr>
<td>11</td>
<td>Dr John Wamsley</td>
<td>Earth Sanctuaries Ltd</td>
</tr>
<tr>
<td>12</td>
<td>Mr Michael Krockenberger</td>
<td>Australian Conservation Foundation</td>
</tr>
<tr>
<td>13</td>
<td>Mr Syd McConachy</td>
<td>The Victorian Aquaculture Council</td>
</tr>
<tr>
<td>14</td>
<td>Assoc Professor Frank Fisher</td>
<td>Department of Geography and Environmental Science, Monash University</td>
</tr>
<tr>
<td>15</td>
<td>Mr J R May</td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>Mr Peter Mirtschin</td>
<td>Venom Supplies Pty Ltd</td>
</tr>
<tr>
<td>17</td>
<td>Mr Peter Barber</td>
<td>Royal Society for Prevention of Cruelty to Animals Victoria Inc.</td>
</tr>
<tr>
<td>18</td>
<td>Mr &amp; Mrs O &amp; B Thompson</td>
<td></td>
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<tr>
<td>19</td>
<td>Mr Mick Moran</td>
<td></td>
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<tr>
<td>20</td>
<td>Mr Greg Barowski</td>
<td>Emu Industry Development Committee</td>
</tr>
<tr>
<td>21</td>
<td>Mr Robert Bant</td>
<td></td>
</tr>
<tr>
<td>22</td>
<td>Ms Yvonne Cowling</td>
<td>The Possum Lady</td>
</tr>
<tr>
<td>23</td>
<td>Mr Malcolm East</td>
<td></td>
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<tr>
<td>24</td>
<td>Mr Stephen Royals</td>
<td></td>
</tr>
<tr>
<td>25</td>
<td>Ms Sari Cuce</td>
<td></td>
</tr>
<tr>
<td>26</td>
<td>Dr Philip Moors</td>
<td>Royal Botanic Gardens Melbourne</td>
</tr>
<tr>
<td>Submission No.</td>
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<td>Organisation</td>
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</tr>
<tr>
<td>27</td>
<td>Mr M Mitchell</td>
<td>Sporting Shooters Association of Australia (Vic) Inc., East Gippsland Branch</td>
</tr>
<tr>
<td>28</td>
<td>Messrs Trevor, Walter &amp; Graham Miles</td>
<td></td>
</tr>
<tr>
<td>29</td>
<td>Mr Andrew Tytherleigh</td>
<td></td>
</tr>
<tr>
<td>30</td>
<td>Mr Euan Moore</td>
<td>Birds Australia Conservation Committee</td>
</tr>
<tr>
<td>31</td>
<td>Mr Gil Freeman</td>
<td>The Southern Bushfood Association</td>
</tr>
<tr>
<td>32</td>
<td>Mr Doug Humann</td>
<td>Australian Bush Heritage Fund</td>
</tr>
<tr>
<td>33</td>
<td>Mr Roger Bourne</td>
<td>The Natural Australian Meat Company</td>
</tr>
<tr>
<td>34</td>
<td>Mr Michael J. Delahunty</td>
<td>M.P. Game</td>
</tr>
<tr>
<td>35</td>
<td>Mr Michael Kearney</td>
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<tr>
<td>36</td>
<td>Ms Tess Holderness</td>
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<tr>
<td>37</td>
<td>Mr Gary Pegg</td>
<td>The Australian Taxidermists Association</td>
</tr>
<tr>
<td>38</td>
<td>Mr Howard Wildman</td>
<td>AMRAD Discovery Technologies Pty Ltd</td>
</tr>
<tr>
<td>39</td>
<td>Dr Maxwell King</td>
<td>Safari Club International (Australia South Pacific) Inc.</td>
</tr>
<tr>
<td>40</td>
<td>Mr Peter Comber</td>
<td>Victorian Herpetological Society Inc.</td>
</tr>
<tr>
<td>41</td>
<td>Mr Rod Drew</td>
<td>Victorian Field and Game Association Inc. and Shooting Sports Council of Victoria</td>
</tr>
<tr>
<td>42</td>
<td>Mr Glenn Sant</td>
<td>Trade Records Analysis of Flora and Fauna in Commerce (Oceania) Inc.</td>
</tr>
<tr>
<td>43</td>
<td>Mr Tom Osborne</td>
<td>Eels Australis Pty Ltd</td>
</tr>
<tr>
<td>44</td>
<td>Mr Ian Lobban</td>
<td>VFF Land Management Committee</td>
</tr>
<tr>
<td>45</td>
<td>Mr &amp; Ms Bruce &amp; Sue McInnes</td>
<td>Wartook Native Fish Culture</td>
</tr>
<tr>
<td>46</td>
<td>Ms Philippa Walsh</td>
<td>World Wide Fund for Nature Australia</td>
</tr>
<tr>
<td>47</td>
<td>Mr Colin Wood</td>
<td>Victorian Game and Deer Stalking Association (VICGAME)</td>
</tr>
<tr>
<td>48</td>
<td>Ms Helen Wallis</td>
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<td>49</td>
<td>Mr Philip Brown</td>
<td>Sporting Shooters Association of Australia (Victoria) Inc.</td>
</tr>
<tr>
<td>50</td>
<td>Mr &amp; Mrs Les &amp; Rosemary Vulcz</td>
<td>Mr Fern</td>
</tr>
<tr>
<td>51</td>
<td>Mr Jim Robinson</td>
<td>Greening Australia - Victoria Inc.</td>
</tr>
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<td>52</td>
<td>Mr Robin Dyall</td>
<td>Environmental Defender's Office</td>
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<tr>
<td>53</td>
<td>Mr Laurie Levy</td>
<td>Coalition Against Duck Shooting</td>
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<td>54</td>
<td>Mr Laurie Levy</td>
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<td>55</td>
<td>Mr Tom De Graaff</td>
<td>Victorian Avicultural Council</td>
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<td>56</td>
<td>Ms Carole de Fraga</td>
<td>Animals Australia</td>
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<td>Ms Yvonne Taylor</td>
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<td>Mr Bob McDonald</td>
<td>Victorian Apiarists' Association</td>
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<td>59</td>
<td>Ms Chelsea Stewart</td>
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<td>Ms Amanda Martin</td>
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<td>Mr Andrew Walsh</td>
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<td>Wimmera Catchment Management Authority</td>
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<td>Ms Indira Narayan</td>
<td>Friends of the Earth</td>
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<td>Miss G Willoughby</td>
<td>Mid-Murray Field Naturalists Club</td>
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<td>67</td>
<td>Mr Michael Taylor</td>
<td>Department of Natural Resources and Environment</td>
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<td>68</td>
<td>Mr Jeff Weir</td>
<td>Dolphin Research Institute Inc.</td>
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<td>74</td>
<td>Mr Rob Meneilly</td>
<td>Marsupial Society of Victoria Inc.</td>
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### APPENDIX V

**LIST OF INSPECTIONS AND INFORMAL BRIEFINGS**

<table>
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<td>1</td>
<td>17/12/99</td>
<td>Melbourne</td>
<td>Melbourne National Flower Centre – wholesale distribution</td>
<td>Mr Ian Webb, Dr Rod Jones</td>
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<td>18/1/99</td>
<td>Amsterdam</td>
<td>Australian Embassy</td>
<td>Mr Ted Delofki</td>
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<td>3</td>
<td>19/1/99</td>
<td>Aalsmeer</td>
<td>Aalsmeer Flower Auctions</td>
<td>Mr Dick van Dam, Ms Betty Daniels-Schmidt</td>
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