



# **TERRESTRIAL BIOLOGICAL SURVEYS AS AN ELEMENT OF BIODIVERSITY PROTECTION**

**Position Statement No. 3**

**March 2002**



**Environmental Protection Authority**

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## FOREWORD

The Environmental Protection Authority (EPA) publishes Position Statements, from time to time, as a means of informing the public about the EPA's views on matters of environmental importance. They also provide a basis for the development of the associated series of statements entitled *Guidance for the Assessment of Environmental Factors*.

This is the Third of the Position Statement series, and it is about biodiversity protection and the requirements for terrestrial biological surveys for Environmental Impact Assessment (EIA) in Western Australia.

A preliminary Position Statement entitled *General Requirements for Terrestrial Biological Surveys* was published in May 2000 and public comment was invited. As a result of those comments and further consideration by the EPA, this final Position Statement incorporates considerable amendments. This has also led to a change in the Position Statement title. The general requirements for terrestrial biological surveys have been placed within the broader context of the EPA's overarching principles for the assessment of the impact of proposals where biodiversity is an important element.

Terrestrial biological surveys are an essential component of EIA for many proposals considered by the EPA. This Position Statement outlines the principles in relation to the provision of information in the assessment of biodiversity and provides information which will assist proponents and their consultants to focus attention on the importance of biodiversity and the expectations of the EPA in the provision of survey data.

The Position Statement also aims to provide the basis for a series of Guidance Statements, to follow this Position Statement, which will provide more detailed guidance and protocols for various types and levels of surveys.

The EPA was pleased to receive a positive response to the preliminary statement, and this final statement has been improved as a result of the public input.

I commend this Position Statement for your reading and acceptance of the principles for assessment where biodiversity is an important element.



Bernard Bowen  
Chairman  
Environmental Protection Authority



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# 1. INTRODUCTION

The flora and fauna of Western Australia is recognised as being internationally significant. Accordingly, the Environmental Protection Authority (EPA) regards biological diversity as a key environmental factor and has an objective to ensure that biodiversity is protected. Essential to the EPA's consideration of biodiversity is the quality of the data provided, especially in relation to terrestrial biological surveys.


The EPA is concerned that, at times, insufficient attention is given to the relevant detail of terrestrial biological surveys for the purposes of environmental impact assessment, in relation to the scale and the nature of the impact, and the significance or sensitivity of the receiving environment. This may mean that the information supplied is inadequate to allow the EPA to undertake a comprehensive assessment, resulting in potential delays in the progress of an assessment while additional or appropriate information is collected. The EPA recognises that the absence of acceptable standard protocols may also result in inconsistency of effort and value of data collected.

In addition, there is a need to improve existing terrestrial biological survey standards in Western Australia. Western Australia was the first State to become a signatory to the *National Strategy for the Conservation of Australia's Biological Diversity* (Commonwealth of Australia, 1996) which followed from Australia's ratification of the *United Nations Convention on Biological Diversity* (1992). This Position Statement discusses the principles which the EPA will use when assessing proposals which may impact on biodiversity values, as well as the:

- definition of biodiversity;
- principles as defined in the *National Strategy for the Conservation of Australia's Biological Diversity* (Commonwealth of Australia, 1996);
- objectives and targets as defined in the *National Objectives and Targets for Biodiversity Conservation* (Commonwealth of Australia, 2001)
- intrinsic and functional biodiversity values;
- consideration of ecological function values of a range and sequence of habitats and processes, as a means of protecting biodiversity;
- use of the precautionary principle;
- use of Interim Biogeographic Regionalisation of Australia (IBRA)<sup>1</sup> at the regional scale, to guide assessment of variable levels of impact in different regions of the State;
- quality of information gathered; and
- contribution to the bank of data for the area.

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<sup>1</sup> Interim Biogeographic Regionalisation of Australia (IBRA) From: Thackway, R. and Cresswell, I.D. 1995 (Eds). *An Interim Biogeographic Regionalisation for Australia: A framework for establishing the national system of reserves, Version 4.0.* Australian Nature Conservation Agency, Canberra.



Biological surveys for environmental impact assessment (EIA) are generally based on surveys of the flora and vegetation and vertebrate fauna, with flora and vegetation surveys often providing the main assessment structure. Although this Position Statement focuses largely on flora and vegetation, it is emphasised that biodiversity encompasses the total variety of life forms including plants, animals and micro-organisms and the processes and ecosystems they form. Protection of biological diversity is about protecting those processes and ecosystems.

The outcomes sought by this Position Statement are intended to:

- promote and encourage all proponents and their consultants to focus their attention on the significance of biodiversity and therefore the need to develop and implement best practice in terrestrial biological surveys; and
- enable greater certainty for proponents in the EIA process by defining the principles the EPA will use when assessing proposals which may impact on biodiversity values.

## **2. BIODIVERSITY PROTECTION IN WESTERN AUSTRALIA**

### **2.1 Western Australia's Strengths in Biodiversity Protection**

The EPA acknowledges that Western Australia has many positive strengths which contribute to the protection of biodiversity through EIA. These include:

- the *Environmental Protection Act 1986* (Western Australia) that provides for an open and public process for assessment of the environmental impact of proposals;
- recent amendments to key legislation, government positions and/or land conservation practices which will work towards better protection of biological values through EIA (for example, the *Environment Protection and Biodiversity Conservation Act 1999* (Commonwealth of Australia); the *Soil and Land Conservation Amendment Act 1994* (Western Australia); *Position Statement No 2 Environmental Protection of Native Vegetation in Western Australia* (Environmental Protection Authority, 2000); and the attention to biodiversity as a factor in the approval process for applications to clear native vegetation, submitted under the *Soil and Land Conservation Act 1945* (Western Australia));
- the availability of high level professional and technical expertise;
- a range of organisations and government agencies with technical and professional expertise which are in a position to contribute to the documentation, protection and restoration of biodiversity (for example, the Department of Conservation and Land Management, the WA Museum, the Botanic Parks and Gardens Authority, the DEP, tertiary institutions, conservation and community groups, government agencies and utilities, and philanthropic private companies);
- increasing community awareness and expectations;
- good library resources;
- a developing capability for accumulating biodiversity information collected in terrestrial biological surveys within a comprehensive database integrated with GIS;
- comprehensive information collected to high standards in some areas; and
- a relatively low population.

### **2.2 Present Issues Facing Environmental Impact Assessment (EIA) of Biodiversity Values**

In recent years, it has become apparent that the global community recognises the high diversity of biological values in Australia. In considering the impacts that any proposal may have on Western Australia's biodiversity values, the EPA recognises that proponents and their consultants also play a major role in defining these biodiversity values.

However, without clear and achievable standards for measuring and describing biodiversity and its related values, consistent and high quality environmental impact assessment of proposals is extremely difficult to achieve.

The EPA experiences difficulties when undertaking assessments where an understanding of the impacts of a proposal on the biodiversity values of an area is an important factor. These

difficulties predominantly relate to a lack of appropriate, targeted information which would enable the EPA to clearly assess the impacts of a proposal on the local and regional biodiversity values. The key issues contributing to this difficulty include:

- the absence of appropriately detailed baseline information for many areas of the State, required for appropriate assessment in a regional context;
- a shortage of new graduate botanists and zoologists developing and maintaining their skills and expertise in biological survey;
- insufficient resources allocated by proponents for appropriate surveys;
- uncertainty about the validity of using and/or interpreting the results of previous surveys and thus their adequacy for a current assessment;
- the limited value (for EIA purposes) of site-specific data which is not interpreted/analysed for biodiversity value by placing it in a local or regional context;
- the absence of standards/definitions for regional/local/intrinsic values;
- insufficient reference to available databases and current literature (both published and unpublished);
- the absence of a consolidated database;
- inaccuracies in species identification and insufficient verification by herbarium or museum specimens where appropriate;
- inappropriate timing of surveys, particularly where full flora and fauna information is important because there is a high probability of significant species, such as, in remote areas with limited or no previous collections, locations of high endemism, locations where rare and priority species or threatened ecological communities are highly likely to be found, and edges of bioregions and/or other transition zones;
- insufficient information on the condition of the vegetation and the absence of common standards for assessment of that condition;
- insufficient information on the rehabilitation potential and the effort required to rehabilitate;
- the absence of documented general requirements for surveys and the pressure of time constraints for project approvals provides little encouragement to improve the quality of surveys; and
- uncertainty generated by inconsistency in advice from departments and within departments, and the modification of advice during the course of an assessment.

Many of these issues can be addressed through the development of general standard requirements for terrestrial biological surveys, as will be outlined in the Guidance Statement series, and through the development of a consolidated database where standardised information on the biodiversity values of the State is increased incrementally and readily available for future requirements.



### **3. EPA'S OVERARCHING PRINCIPLES FOR ENVIRONMENTAL IMPACT ASSESSMENT OF BIODIVERSITY**

The key to having sound and transparent assessment of biodiversity as an element of the environment is to have the community, proponents and consultants understand the overarching principles which form the basis of the EPA's expectations when assessments are being undertaken.

1. The Environmental Protection Authority (EPA) adopts the definition of Biological Diversity and the Principles as defined in the *National Strategy for the Conservation of Australia's Biological Diversity* (Commonwealth of Australia, 1996) and will have regard for these in undertaking its role.
2. The EPA expects proponents to demonstrate in their proposals that all reasonable measures have been undertaken to avoid impacts on biodiversity. Where some impact on biodiversity cannot be avoided, it is for the proponent to demonstrate that the impact will not result in unacceptable loss.
3. The EPA aims to ensure that the information gathered for environmental impact assessment in Western Australia meets State, National, and International Agreements, Legislation and Policy in regard to biodiversity conservation.
4. The EPA requires that the quality of information and scope of field surveys meets the standards, requirements and protocols as determined and published by the EPA.
5. The EPA will use the Interim Biogeographic Regionalisation of Australia (IBRA) as the largest unit for EIA decision-making in relation to the conservation of biodiversity. The IBRA has identified 26 bioregions in the State (Figure 1) which are affected by a range of different threatening processes and have varying levels of sensitivity to impact.
6. The EPA expects proponents to ensure that terrestrial biological surveys provide sufficient information to address both biodiversity conservation and ecological function values within the context of the type of proposal being considered and the relevant EPA objectives for protection of the environment.
7. The EPA expects that terrestrial biological surveys will be made publicly available and will contribute to the bank of data available for the particular region, to aid the overall biodiversity understanding and assessment by facilitating transfer into State biological databases.
8. In the absence of information that could provide the EPA with assurance that biodiversity will be protected, the EPA will adopt the precautionary principle.

### 3.1 Biological Diversity

The Environmental Protection Authority (EPA) adopts the definition of Biological Diversity and the Principles as defined in the *National Strategy for the Conservation of Australia's Biological Diversity* (Commonwealth of Australia, 1996) and will have regard for these in undertaking its role.

The Strategy defines Biological Diversity as the variety of life forms, the different plants, animals and micro-organisms, the genes they contain and the ecosystems they form. Biological diversity, referred to as Biodiversity, is usually considered at three levels: genetic diversity, species diversity and ecosystem diversity (Commonwealth of Australia, 1996).

The Principles of the *National Strategy for the Conservation of Australia's Biological Diversity* are as follows:

1. Biological diversity is best conserved in-situ.
2. Although all levels of government have a clear responsibility in the conservation of biological diversity, the cooperation of conservation groups, resource users, indigenous peoples, and the community in general is critical.
3. It is vital to anticipate, prevent and attack at source the causes of significant reduction or loss of biological diversity.
4. Processes for and decisions about the allocation and use of Australia's resources should be efficient, equitable and transparent.
5. Lack of full knowledge should not be an excuse for postponing the action to conserve biological diversity.
6. The conservation of Australia's biological diversity is affected by international activities and requires actions extending beyond Australia's national jurisdiction.
7. Australians operating beyond our national jurisdiction should respect the principles of conservation and ecologically sustainable use of biological diversity and act in accordance with any relevant national or international laws.
8. Central to the conservation of Australia's biological diversity is the establishment of a comprehensive and adequate system of ecologically viable protected areas integrated with the sympathetic management of all other areas, including agricultural and other resource production systems.
9. The close and traditional association of Australia's indigenous peoples with components of biological diversity should be recognised, as should the desirability of sharing equitably benefits arising from the innovative use of traditional knowledge of biological diversity.

### 3.2 Impact on Biodiversity

The EPA expects proponents to demonstrate in their proposals that all reasonable measures have been undertaken to avoid impacts on biodiversity. Where some impact on biodiversity cannot be avoided, it is for the proponent to demonstrate that the impact will not result in unacceptable loss.

The EPA considers that one of the key principles in the protection of biodiversity is to avoid impact wherever this is achievable. The EPA expects proponents to demonstrate that all reasonable measures have been taken to avoid impact through consideration of the effect on

biodiversity, of a range of outcome based options and/or site alternatives. Where some impact on biodiversity cannot be avoided, it is for the proponent to demonstrate that the impact of the option and/or alternative selected will not result in an unacceptable loss. This will require information to relate the loss to a regional context, and to consider the cumulative impacts of threatening processes such as previous broad-scale land use or development, plant disease or invasion of exotic organisms.

### **3.3 State, National and International Agreements, Legislation and Policy on Biodiversity**

The EPA aims to ensure that the information gathered for environmental impact assessment in Western Australia meets State, National, and International Agreements, Legislation and Policy in regard to biodiversity conservation.

In attempting to define general standards for biological surveys for EIA, the EPA aims to adequately and consistently address the requirements of policy and legislation designed to protect biodiversity, taking into account the level of protection expected by government and the broad community.

Over the last two decades there has been growing global community expectation that best practice be applied to environmental matters. This growth in community expectation is reflected in the development of legislation and agreements at the international level, to which Australia has become a signatory and which have become translated into national and state strategies, agreements and legislation. These include over 300 Acts and Ordinances that impact on environmental matters in Australia (Hughes, 1999). In some cases policies or legislation make specific reference to protection of biodiversity, or elements thereof, and EIA is an important tool in defining the nature and extent of protection required where proposals or other forms of development have potential for significant environmental impacts.

Some of the most significant agreements, legislation and policies in the Western Australian context are outlined in Appendix 1 and include:

#### **Agreements**

- 1971 – *Convention on Wetlands of International Importance, Especially as Waterfowl Habitat* (Ramsar, Iran).
- 1972 – *Convention Concerning the Protection of the World Cultural and Natural Heritage* (Paris, France).
- 1974 – Agreement between the Government of Australia and the Government of Japan for the *Protection of Migratory Birds and Birds in Danger of Extinction and their Environment* (Japan-Australia Migratory Bird Agreement – JAMBA).
- 1975 – *Convention on International Trade in Endangered Species of Wild Fauna and Flora* (CITES).
- 1979 – *Convention on the Conservation of Migratory Species of Wild Animals* (held in Bonn, Germany).
- 1986 – Agreement between the Government of Australia and the Government of the People's Republic of China for the *Protection of Migratory Birds and their Environment* (China-Australia Migratory Bird Agreement – CAMBA).

- 1992 – *Convention on Biological Diversity*, United Nations (held in Rio de Janeiro).
- 1992 – *Intergovernmental Agreement on the Environment* (Council of Australian Governments, Canberra, ACT).
- 1999 – *Regional Forest Agreement for the South-West Forest Region of Western Australia* (Commonwealth of Australia and the State of Western Australia).

### Legislation

- 1945 – *Soil and Land Conservation Act 1945* (Western Australia).
- 1950 – *Wildlife Conservation Act 1950* (Western Australia).
- 1984 – *Conservation and Land Management Act 1984* (Western Australia).
- 1986 – *Environmental Protection Act 1986* (Western Australia).
- 1994 – *Soil and Land Conservation Amendment Act 1994* (Western Australia).
- 1999 – *Environment Protection and Biodiversity Conservation Act 1999* (Commonwealth of Australia).

### Policies

- 1983 – *Conservation Reserves for Western Australia as recommended by the Environmental Protection Authority. The Darling System. System 6, Part I and II.* (Department of Conservation and Environment, Western Australia).
- 1991 – *Australia and New Zealand Environment Conservation Council* (ANZECC).
- 1992 – *National Strategy for Ecologically Sustainable Development* (Commonwealth of Australia, Canberra, ACT).
- 1992 – *Draft Nature Conservation Strategy* (Department of Conservation and Land Management, Western Australia).
- 1996 – *National Strategy for the Conservation of Australia's Biodiversity* (Commonwealth of Australia, Canberra, ACT).
- 1996 – *Guidelines and Criteria for Determining the Need for and Level of EIA in Australia* (ANZECC, Canberra, ACT).
- 1997 – *Basis for a National Agreement on Environmental Impact Assessment* (ANZECC, Canberra, ACT).
- 1999 – *Australian Guidelines for Establishing the National Reserve System* (Environment Australia, Commonwealth of Australia, Canberra, ACT).
- 2000 – *Position Statement No. 2, Environmental Protection of Native Vegetation in Western Australia* (Environmental Protection Authority, Western Australia).
- 2000 – *Preliminary Position Statement No. 3, General Requirements for Terrestrial Biological Surveys* (Environmental Protection Authority, Western Australia).
- 2000 – *Bush Forever* (Government of Western Australia).
- 2001 – *National Objectives and Targets for Biodiversity Conservation 2001 – 2005* (Environment Australia, Commonwealth of Australia, Canberra, ACT).

#### Other

- 1990 – Special Premiers’ Conference identified the need for an agreement on the environment.

### **3.4 EPA Standards, Requirements and Protocols**

The EPA requires that the quality of information and scope of field surveys meets the standards, requirements and protocols as determined and published by the EPA.

Where a project or an action is likely to affect biodiversity, the information gathered for EIA via desktop studies and biological surveys should enable the impacts of the proposal and their environmental significance to be determined to an acceptable level. The EPA expects that, as a minimum, biological surveys will provide a sufficient level of detail so that the related assessments and any proposals that receive environmental approval meet both national and international standards (see Section 3.3). While it is recognised that the scope of each survey conducted for the purposes of EIA depends on the scale and nature of the impact of a proposal and the sensitivity of the receiving environment, the EPA expects that the quality of information and scope of each survey meets the standard requirements determined by the EPA.

Table 1 provides an indicative guide to the level of investigation required for EIA related biological surveys. The forthcoming series of Guidance Statements (see Section 4) will provide more detailed guidance and interpretation of this table.

**Table 1: Indicative levels of biological survey expected by the EPA in relation to the scale and nature of the impact and the sensitivity of the receiving environment.**

Sensitivity of Environment (Bioregions)	Scale and Nature of Impact		
	High	Moderate	Low
WAGEMS <sup>1</sup>	2	2	1
GCYPCMNHJ <sup>2</sup> DNCOV <sup>3</sup>	2	1 or 2	1
GGGLCT <sup>4</sup>	2	1	1

**Bioregions**

<sup>1</sup> Warren, Avon Wheatbelt, Geraldton Sandplains, Esperance Plains, Mallee, Swan (Largely Cleared) (WAGEMS)

<sup>2</sup> Gascoyne, Carnarvon, Yalgoo, Pilbara, Coolgardie, Murchison, Nullarbor, Hampton, Jarrah Forest (GCYPCMNHJ)

<sup>3</sup> Dampierland, Northern Kimberley, Central Ranges, Ord-Bonaparte, Victorian-Bonaparte (DNCOV)

<sup>4</sup> Great Sandy Desert, Gibson Desert, Great-Victoria Desert, Little Sandy Desert, Central Desert, Tanami. (GGGLCT)

Note: For explanation of the numbers in Table 1, see Levels of Biological Survey box below; and for explanation of bioregion groupings (under Sensitivity of Environment), see Section 3.5.

**Levels of Biological Survey:**

**1 Desktop Study** - literature review, including map based information search of all current and relevant literature sources and databases; and

**Reconnaissance Survey** – site visit by qualified personnel to:

- a) verify desktop survey;
- b) delineate key flora and fauna values present in the area and potential sensitivity to impact; and
- c) undertake broad-scale vegetation and vegetation condition mapping based on selected sites rather than regular gridding.

**2 Desktop Study;** and

**Reconnaissance Survey;** and

**Comprehensive flora and fauna survey** - Comprehensive flora and fauna survey of the site and, where necessary, its surroundings sufficient to place these characteristics, and the conservation and functional values of the site into a local-regional context.



Figure 1. The 26 Bioregions of Western Australia.

### **3.5 Interim Biogeographic Regionalisation of Australia (IBRA)**

The EPA will use the Interim Biogeographic Regionalisation of Australia (IBRA) as the largest unit for EIA decision-making in relation to the conservation of biodiversity. The IBRA has identified 26 bioregions of the State (Figure 1) which are affected by a range of different threatening processes and have varying levels of sensitivity to impact.

An illustration of the indicative requirements for terrestrial biological surveys in relation to the significance of the impact (as a function of the scale and nature of the impact and sensitivity of the receiving environment) is provided in Table 1.

The bioregions have been grouped in Table 1 according to the existing degree of regional modification or loss of biodiversity, degree of threat and sensitivity to further loss. As a guide to the use of this table, it is very important to note that there will be areas of greater sensitivity within each bioregion that will require special consideration (eg. wetlands, threatened ecological communities, heritage, geomorphological values, etc). Conversely, for areas with a high degree of pre-existing modification (such as cleared agricultural land) the investigation effort expected is likely to be reduced in comparison to areas supporting native vegetation.

### **3.6 Biodiversity Conservation and Ecological Function Values**

The EPA expects proponents to ensure that terrestrial biological surveys provide sufficient information to address both biodiversity conservation and ecological function values within the context of the type of proposal being considered and the relevant EPA objectives for protection of the environment.

Best practice assessment now requires that biodiversity be considered to have two key aspects, namely:

- a) its biodiversity value at the genetic, species, and ecosystem levels; and*
- b) its ecological functional value at the ecosystem level.*

Biological surveys need to provide sufficient information to address both these values within the context of the type of proposal being considered and the relevant EPA objectives for protection of the environment.

The following provides information on the range of levels which need to be considered as well as information on approaches to addressing ecological functional values.

#### **Genetic level**

Due to a lack of research regarding the genetic range of native species, there has been, and will continue to be, difficulty in fully addressing protection of biodiversity at the genetic level.

There is scope, however, to incorporate consideration of the implications of a development on biodiversity at the genetic level through targeted genetic studies on selected species and through the assessment of impacts on the known distribution and abundance of plant and animal species and communities.



For example, specific targeted genetic studies may highlight specific patterns in local and regional patterns. In addition, by investigating and providing available information on the potential impacts on an affected Declared Rare Flora (DRF) or priority flora or threatened fauna species in the context of the overall population sizes and distribution of that species, it is likely that an assessment would increase the probability that the impact of the proposal on genetic diversity of that species will be considered and adequately addressed in proposal design.

Similarly, by considering the extent, level of reservation and spatial distribution of ecological units that can be correlated to species occurrence (species assemblages, surface or habitat types, ecological communities etc) at the lowest level mapped regionally, an assessment can provide potential options for conservation of genetic diversity within species, through assessment of the level of conservation related units. This use of surrogates for genetic diversity (with due consideration for potential limitations) may partially address the potential problems associated with the absence of detailed information about the precise extent and genetic variability of each species and may also go some way to maintaining the evolutionary processes associated with species as components of ecosystems.

### **Species level**

EIA in WA has historically placed emphasis on conservation of flora biodiversity at the species and species assemblage levels, while fauna has mainly been considered only at the species level, often based on expected occurrence or from a limited survey, or from consideration at habitat and range levels only.

For example, previous review documents presented to the EPA have typically included flora and/or fauna inventory lists with an emphasis on the presence or absence of rare, threatened and priority species (as determined by Department of Conservation and Land Management/WA Museum databases).

It is important to clarify that the intrinsic value of a species should not be judged only by its rarity or how threatened the taxon may be. Even though a species may occur in large numbers, it may be a major component (or 'keystone species') for the sustainability of the system (for example, biomass or distribution may be important). Importantly, species information must also be considered in the context of its geographical range. In the absence of genetic information, conservation of examples over the full geographic extent and range of surface types with which it is associated will ensure that the genotypic and phenotypic range of the species is best conserved.

It is also important to note that, given the incomplete state of knowledge of the State's flora and fauna and their distributions, many un-described, rare or poorly collected species exist that are not formally recognised as rare or threatened species under the *Wildlife Conservation Act 1950* (Western Australia) or listed as priority species.

Finally, it is also important to consider the concept of species as it relates to diversity (or species richness) and endemism. In areas considered to be high biodiversity 'hotspots', species richness and endemism may be focused and changes in species may occur over relatively short distances. These areas may have enhanced intrinsic and functional significance.

### **Ecosystem level**

Ecosystem values have traditionally been attributed to large-scale species assemblages with an assumption that functional relationships and ecosystem processes are expressed through

the variety of assemblages, their relationship with the landscape, and with each other. Species assemblages can be described in a number of ways and at a range of levels, for example:

- Floristic associations;
- Vegetation communities;
- Vegetation complexes;
- Ecological vegetation systems;
- Floristic community types; and
- Structural types.

The EPA holds the view that prior to selecting the methodology for defining vegetation or systems in a project area, consideration should be given to previous mapping undertaken at a local and regional scale.

There is also an increasing need for the impacts of proposals on system dynamics to be considered as part of environmental assessment and project planning. The EPA intends to give increasing consideration to protection of ecosystems as units representing a range and sequence of habitats and processes, as a means of protecting biodiversity.

In this context ecosystems reflect underlying changes in functions of the systems in response to changing conditions in the environment. For example, on the basis of historical and regional trends in vegetation on the Swan Coastal Plain, there have been shifts from vegetation communities that tolerate seasonally moist conditions to those that are characterised by drier conditions in response to the lower rainfall conditions since the wetter 1960's. This has led to the loss of some wetland communities and a shift towards communities that can tolerate drier site conditions. These changes have occurred in both a local and regional context along catenas of landforms, soils and site conditions at different rates within different climate zones.

In the EIA context, an understanding of, and the ability to conserve representative samples of these ecosystems becomes critical in managing the environment.

### **3.7 State Biological Databases**

The EPA expects that terrestrial biological surveys will be made publicly available and will contribute to the bank of data available for the particular region, to aid the overall biodiversity understanding and assessment by facilitating transfer into State biological databases.

In addition to meeting the objective of demonstrating whether or not loss in biodiversity resulting from a development proposal will be acceptable, there is a growing need for the EIA-related biological surveys to be undertaken and recorded in a way that ensures that the results of the surveys will contribute to the development of a bank of data which can be used to enhance the broad community's knowledge and understanding of biodiversity. Such databases will, over time, contribute significantly to improved decision-making capacity, reduced costs for EIA and conservation of biodiversity.

The EPA intends to encourage the coordinated development of a state-wide database for EIA-related biological surveys in consultation with environmental practitioners and Western Australian natural resource management agencies and authorities.

### 3.8 Precautionary Principle

In the absence of information that could provide the EPA with assurance that biodiversity will be protected, the EPA will adopt the precautionary principle.

In the absence of a clear understanding of relationships between species and their ecosystems and underlying environments, and the significance of the species and relationships, the assessment of impacts and the significance of particular habitat areas impacted upon, become open to interpretation. Under such circumstances of uncertainty, the EPA will be inclined to adopt the precautionary principle.

The definition accepted by all the States and Territories who are party to the *Intergovernmental Agreement on the Environment* (IGAE) states:

*Precautionary principle*

*Where there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason to postpone measures to prevent environmental degradation. In the application of the precautionary principle, public and private decisions should be guided by:*

- *careful evaluation to avoid, wherever practicable, serious or irreversible damage to the environment; and*
- *an assessment of the risk-weighted consequences of various options.*

(IGAE, 1992, section 3.5.1)

This provides an approach for considering the environmental impacts of a proposal on biodiversity values where there is a lack of knowledge and lack of scientific certainty. A useful methodology for applying the precautionary principle is that of Deville and Harding (1997).

## 4. EPA GUIDANCE STATEMENTS

The EPA intends to provide guidance on the general requirements for terrestrial biological surveys through a series of Guidance Statements, the first of which is expected to be Preliminary Guidance Statement No. 51: *Terrestrial Flora and Vegetation Surveys and Analysis*. These particular Guidance Statements are intended to provide an easy-to-use decision-making guide to the level of terrestrial biological survey required.

## 5. SELECTED BIBLIOGRAPHY <sup>1</sup>

Atkins K.J. (2001). *Declared Rare and Priority Flora List for Western Australia*. Department of Conservation and Land Management, Perth, WA.

Beard, J.S. (1990). *Plant Life of Western Australia*. Kangaroo Press Pty Ltd, Kenthurst, NSW.

Christian, C.S. and Stewart, G.A. (1953). General report on Survey of Katherine-Darwin region 1946. *CSIRO Australian Land Research Series* 1.

Curry, P.J., Payne, A.L., Leighton, K.A., Hennig, P. and Blood, D.A. (1994). *An Inventory and Condition Survey of the Murchison River Catchment, Western Australia*. Technical Bulletin No. 84, Department of Agriculture, Perth, WA.

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<sup>1</sup> A list of Agreements, Legislation and Policies is included on pp 7-9.

Department of Conservation and Environment (1983). *Conservation Reserves for Western Australia. The Darling System - System 6, Parts 1 and 2. Report 13.* Department of Conservation and Environment, Perth, Western Australia.

Deville, A. and Harding, R. (1997). *Applying the Precautionary Principle.* The Federation Press, Sydney.

Diels, L. (1906). *Die Pflanzenwelt von Western-Australien südlich des Wendekreises.* Vegn. Erde 7, Leipzig.

English, V. and Blyth, J. (1997). *Identifying and Conserving Threatened Ecological Communities (TECS) in the South West Botanical Province.* Department of Conservation and Land Management, Western Australia.

Havel, J.J. (2000). *Ecology of the forests of south western Australia in relation to climate and landforms.* Ph.D. Thesis, Murdoch University, Western Australia.

Hedde, E.M., Loneragan, O.W. and Havel, J.J. (1980). Vegetation Complexes of the Darling System, Western Australia. In: *Atlas of Natural Resources, Darling System, Western Australia. Explanatory Text.* Department of Conservation and Land Management, Western Australia, Perth. Pp 37-72.

Hughes, L. (1999). Environmental Impact Assessment in the Environment Protection and Biodiversity Conservation Act 1999 (Commonwealth of Australia). *Environment and Planning Law Journal* 16 (5): 441 - 467.

Lange, R.T. (1960). Rainfall and soil control of tree species distribution around Narrogin, Western Australia. *J. Roy. Soc. W. Aust.* 43:104-110.

Mattiske, E.M. and Havel, J.J. (1998). *Vegetation Complexes of the South-west Forest Region of Western Australia.* Maps and report prepared as part of the Regional Forest Agreement, Western Australia for the Department of Conservation and Land Management and Environment Australia.

Odum, E.P. (1971). *Fundamentals of Ecology, 3rd Edition.* Saunders, Philadelphia.

Thackway, R. and Cresswell, I.D. (1995) (Eds). *An Interim Biogeographic Regionalisation for Australia: A framework for establishing the national system of reserves, Version 4.0.* Australian Nature Conservation Agency, Canberra.

## 6. GLOSSARY

For the purposes of this Position Statement:

**Biological Diversity** - The variety of life forms, the different plants, animals and micro-organisms, the genes they contain and the ecosystems they form. Biological Diversity, also referred to as Biodiversity, is usually considered at three levels: genetic diversity, species diversity and ecosystem diversity (Commonwealth of Australia, 1996).

**Genetic Diversity** - Variation of genes/genetic information contained in all individual plants, animals and micro-organisms both within and between populations of organisms that comprise individual species as well as between species. Genetic Diversity represents the heritable variation within and between populations of organisms. There are so many genes and different possible combinations of genes that for most types of organism every individual, population and species is genetically distinct.

**Species Diversity** - This can be considered as the variety of individual species within a given area, such as a region. While such diversity can be measured in many ways, the number of species (species richness) is most often used. A more precise measurement of taxonomic diversity also considers the relationship of species to each other. The greater the difference between one species and another species, the greater its contribution to any overall measure of biological diversity. The ecological importance of a species can have a direct effect on community structure and thus on overall biodiversity. The variety of species increases with genetic change and evolutionary processes.

**Ecosystem Diversity** - Ecosystems are the critical biological/ecological operating units in nature. Ecosystem diversity is the diversity of all living organisms and non-living components within a given area and their relationships. Ecosystems include abiotic components, being partly determined by soil, parent material and climate. Ecological system diversity is the variety of habitats, biotic communities and ecological processes in a given area. Ecological processes are the interactions, changes or evolutionary development processes of the ecosystem over time.

Ecosystem diversity is harder to measure than species or genetic diversity because the boundaries of communities (ie. variety of unique assemblages of plants and animals and ecosystems) are elusive. As long as a consistent set of criteria is used to define communities and ecosystems, their number and distribution can be measured. Even using a relatively simplified measure, any given area contributes to biodiversity in at least two different ways: through its richness in numbers of species and through the endemism (geographical uniqueness) of these species. The relative importance of these two factors changes at different geographical scales.

**Local Ecosystem/Regional Ecosystem Diversity** - Individual species and plant communities exist as elements of local ecosystems, linked by processes such as succession and predation. Regional ecosystem diversity is the pattern of local ecosystems across the landscape, and is also known as landscape diversity or large ecosystem diversity. Ecological integrity is maintained when the productivity, stability and resilience of the ecosystem are collectively maintained.

**Other expressions of biodiversity** - Other expressions of biodiversity can be important. These include the relative abundance of species, the age structure of populations, the pattern of communities in a region, changes in community composition and structure over time, and ecological processes such as predation, parasitism and mutualism. It is often important to examine **diversity in ecosystem structure and function** as well as **compositional diversity** of genes, species and ecosystems.

- Diversity of higher taxonomic groups - at the level of fundamental types of body plans or phyla, marine animals display much greater diversity than terrestrial animals. Most diversity on land comes from the phylum Arthropoda.

- Species function based on behaviour/role, eg. different feeding habits, reproductive behaviour, biochemical diversity. More important than the conservation of individual species is not to lose any broad functional category of species.
- In natural systems diversity varies. Many communities with relatively few species, such as those occupying estuaries and mangrove forests, are highly productive and have an abundance of life but not a great variety.

Biodiversity has two key aspects:

- its functional value at the ecosystem level; and
- its intrinsic value at the individual species, species assemblage and genetic levels.

The functional value is derived from the parts played by the species assemblages in supporting ecosystem processes and is expressed through the kinds of plant and animal assemblages occurring in various parts of the landscape. In addressing functional value, matters requiring consideration include:

- soils;
- landscape;
- species richness;
- species composition;
- differences in species composition pre- and post-disturbance; and
- the ecosystem processes, linkages and how they are supported.

The intrinsic values relate to the actual species and species associations. Two species assemblages may have different intrinsic values but may still have the same functional value in terms of the part they play in maintaining ecosystem ecological processes.

#### **Declared Rare Flora - DRF**

Extant Taxa - Taxa which have been adequately searched for and are deemed to be in the wild either rare, in danger of extinction, or otherwise in need of special protection, and have been gazetted as such.

Presumed Extinct Taxa - Taxa which have not been collected, or otherwise verified, over the past 50 years despite thorough searching, or of which all known wild populations have been destroyed more recently, and have been gazetted as such.

Declared Rare Flora - Taxa listed in Wildlife Conservation (Rare Flora) Notice 2001 in Government Gazette pages 4246 – 4251 published on 14 August 2001 or those listed in any subsequent notices.

#### **Ecological community -**

*a naturally occurring biological assemblage that occurs in a particular type of habitat.*  
(English and Blyth, 1997).

*an assemblage of native species that:*

- inhabits a particular area in nature; and*
- meets the additional criteria specified in the regulations made for the purposes of this definition.*

(Environment Protection and Biodiversity Conservation Act 1999).

**Habitat** is defined as:

*the abiotic features of the place in which an assemblage of organisms live* (adapted from Odum, 1971).

**Land system** - is a

*unit, which is a composite of related units (land units), as an area, or group of areas, throughout which there is a recurring pattern of topography, soils and vegetation. A change in this system determines the boundary of a land system. A land system may be Simple, Complex, or Compound.* (Christian and Stewart, 1953).

Discrete areas of a land system generally occur in areas greater than 5km<sup>2</sup> and are therefore of a scale suitable for mapping at 1:250,000 (Curry *et al.* 1994). In Western Australia they have been based on a great deal of quantitative information (including geomorphology, soils and plant species).

**Land unit** –

*Land systems consist of a number of smaller land units or elements, each of which has a distinctive photographic pattern. The relative proportion of the component units and their arrangement one to another gives the broader three dimensional pattern that characterises the particular land system.* (Curry *et al.* 1994).

**Priority Flora Species** –

Priority One – Poorly Known Taxa – Taxa which are known from one or a few (generally <5) populations which are under threat, either due to small population size, or being on lands under immediate threat, e.g. road verges, urban areas, farmland, active mineral leases, or the plants are under threat, e.g. from disease, grazing by feral animals. This group may include taxa with threatened populations on protected lands. Such taxa are under consideration for declaration as ‘rare flora’, but are in urgent need of further survey.

Priority Two – Poorly Known Taxa – Taxa which are known from one or a few (generally <5) populations, at least some of which are not believed to be under immediate threat (i.e. not currently endangered). Such taxa are under consideration for declaration as ‘rare flora’, but are in urgent need of further survey.

Priority Three – Poorly Known Taxa – Taxa which are known from several populations, and are not believed to be under immediate threat (i.e. not currently endangered), either due to the number of known populations (generally >5), or known populations being large, and either widespread or protected. Such taxa are under consideration for declaration as ‘rare flora’, but are in need of further survey.

Priority Four – Rare Taxa – Taxa which are considered to have been adequately surveyed and which, whilst being rare (in Australia), are not currently threatened by any identifiable factors. These taxa require monitoring every 5-10 years.

Priority Flora Species are those taxa listed in Atkins (2001) Declared Rare and Priority Flora List, Department of Conservation and Land Management, or those listed in any subsequent list, usually produced annually.

### Threatened ecological community (1)

As defined by English and Blyth (1997), a threatened ecological community (TEC) is one which is found to fit into one of the following categories: **presumed totally destroyed**, **critically endangered**, **endangered** or **vulnerable**.

The categories **data deficient** and **lower risk** can be used to provide a list of **priority communities**. While not classified as threatened, these still require more information and/or further evaluation, or some low level of monitoring to ensure they do not move into a higher category of threat.

- Category 1

#### **Presumed Totally Destroyed**

An ecological community which has been adequately searched for but for which no representative occurrences have been located. The community has been found to be totally destroyed or so extensively modified throughout its range that no occurrence of it is likely to recover its species composition and/or structure in the foreseeable future.

- Category 2

#### **Critically endangered**

An ecological community which has been adequately surveyed and found to have been subject to a major contraction in area and/or which was originally of limited distribution and is facing severe modification or destruction throughout its range in the immediate future, or is already severely degraded throughout its range but capable of being substantially restored or rehabilitated.

- Category 3

#### **Endangered**

An ecological community which has been adequately surveyed and found to have been subject to a major contraction in area and/or was originally of limited distribution and is in danger of significant modification throughout its range or severe modification or destruction over most of its range in the near future.

- Category 4

#### **Vulnerable**

An ecological community which has been adequately surveyed and is found to be declining and/or has declined in distribution and/or condition and whose ultimate security has not yet been assured and/or a community which is still widespread but is believed likely to move into a category of higher threat in the near future if threatening processes continue or begin operating throughout its range.

- Category 5

#### **Data Deficient**

An ecological community for which there is inadequate data to assign to one of the above categories and/or which is not yet evaluated with respect to status of threat. (Usually an ecological community with poorly known distribution or ecology that is suspected to belong to any of the above categories. These ecological communities have a high priority for survey and/or research).



- Category 6

#### **Lower Risk**

A community which has been adequately surveyed and evaluated and available information suggests that it does not qualify for one of the above categories of threat.

#### **Threatened Ecological Community (2)**

Pursuant to Subdivision A of Division 1 of Part 13 sections 179(3) and 181(1) of the *Environment Protection and Biodiversity Conservation Act 1999* (Commonwealth of Australia), an ecological community can be classified as critically endangered, endangered or vulnerable as follows:

- An ecological community is eligible to be included in the critically endangered category at a particular time if, at that time, it is facing an extremely high risk of extinction in the wild in the immediate future, as determined in accordance with the prescribed criteria (see Regulation 7.01 criteria for listing threatened species).
- An ecological community is eligible to be included in the endangered category at a particular time if, at that time, it is not critically endangered, and it is facing a very high risk of extinction in the wild in the near future.
- An ecological community is eligible to be included in the vulnerable category at a particular time if, at that time, it is not critically endangered or endangered, and it is facing a high risk of extinction in the wild in the medium-term future.

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## APPENDIX 1

### Summary of Key Acts, Agreements And Legislation Related To Protection of Biodiversity

#### Agreements

##### 1971 - Ramsar Convention

On 2 February 1971, the *Convention on Wetlands of International Importance, Especially as Waterfowl Habitat* (held at Ramsar, Iran) defined some broad aims to halt the worldwide loss of wetlands and to conserve, through wise use and management, those that remain. These wetlands include shallow, open waters such as lakes, rivers and coastal fringes, and any land, which is regularly or intermittently saturated by water such as marshes, swamps and floodplains. Presently there are approximately eighty countries which are Contracting Parties to the Ramsar Convention, covering some 75% of the world's lands.

##### 1972 - World Heritage

The *Convention Concerning the Protection of the World Cultural and Natural Heritage*, held in Paris, defines the kind of natural and cultural sites which can be considered for inscription on the World Heritage List, and sets out the duties of the State Parties in identifying potential sites and their role in protecting and preserving them. By signing the Convention, each country pledges to conserve not only the World Heritage sites situated on its territory, but also to protect its national heritage (<http://www.ea.gov.au/heritage/awh/index.html>).

##### 1975 - CITES

On 1 July 1975, the *Convention on International Trade in Endangered Species of Wild Fauna and Flora* (CITES) came into force. With a current membership of 146 countries, these countries act by banning international trade in an agreed list of endangered species and by regulating and monitoring trade in others that might become endangered. CITES provides an official list of endangered, vulnerable or presumed extinct species that is regularly updated.

##### 1979 – Convention on Conservation of Migratory Species

The *Convention on the Conservation of Migratory Species of Wild Animals* (held in Bonn) including JAMBA and CAMBA (<http://www.ea.gov.au/biodiversity/migratory/index.html>).

Many migratory birds make return flights from the northern to the southern hemispheres each year. Conservation of these migratory birds requires international action because the birds depend on protection and appropriate habitat management in a number of countries.

Over the past two decades there has been increasing recognition of the need for international co-operation for the conservation of migratory species and for the protection of specific habitats. Governments have begun to develop formal agreements, of which Australia has two on migratory birds one each with the Governments of Japan and the People's Republic of China.

The Agreement between the Government of Australia and the Government of Japan for the *Protection of Migratory Birds and Birds in Danger of Extinction and their Environment* is more commonly called the Japan–Australia Migratory Bird Agreement (JAMBA) and was signed on 6 February 1974.

The Agreement between the Government of Australia and the Government of the People's Republic of China for the *Protection of Migratory Birds and Birds in Danger of Extinction and their Environment* is more commonly called the China-Australia Migratory Bird Agreement (CAMBA) and was signed on 20 October 1986.

#### **1990 - Special Premiers' Conference**

In 1990, the Special Premiers' Conference identified the need for an agreement on the environment.

#### **1991 - National Approach on EIA**

In 1991, the Australia and New Zealand Environment Conservation Council (ANZECC) recognised the need for a *National Approach on EIA*.

#### **1992 - Intergovernmental Agreement on the Environment**

On 1 May 1992, the *Intergovernmental Agreement on the Environment* was signed by all State and Territory governments and the Commonwealth. This led to the development of EIA procedure principles which are detailed in Schedule 3 of the Agreement and listed as follows:

1. The parties agree that it is desirable to establish certainty about the application, procedures and function of the environmental impact assessment process, to improve the consistency of the approach applied by all levels of Government, to avoid duplication of process where more than one Government or level of Government is involved and interested in the subject matter of an assessment and to avoid delays in the process.
2. The parties agree that impact assessment in relation to a project, program or policy should include, where appropriate, assessment of environmental, cultural, economic, social and health factors.
3. The parties agree that all levels of Government will ensure that their environmental impact assessment processes are based on the following:
  - (i) the environmental impact assessment process will be applied to proposals from both the public and private sectors;
  - (ii) assessing authorities will provide information to give clear guidance on the types of proposals likely to attract environmental impact assessment and on the level of assessment required;
  - (iii) assessing authorities will provide all participants in the process with guidance on the criteria for environmental acceptability of potential impacts including the concept of ecologically sustainable development, maintenance of human health, relevant local and national standards and guidelines, protocols, codes of practice and regulations;
  - (iv) assessing authorities will provide proposal specific guidelines or a procedure for their generation focussed on key issues and incorporating public concern together with a clear outline of the process;
  - (v) following the establishment of specific assessment guidelines, any amendments to those guidelines will be based only on significant issues that have arisen following the adoption of those guidelines;

- (vi) time schedules for all stages of the assessment process will be set early on a proposal specific basis, in consultations between the assessing authorities and the proponent;
- (vii) levels of assessment will be appropriate to the degree of environmental significance and potential public interest;
- (viii) proponents will take responsibility for preparing the case required for assessment of a proposal and for elaborating environmental issues which must be taken into account in decisions, and for protection of the environment;
- (ix) there will be full public disclosure of all information related to a proposal and its environmental impacts, except where there are legitimate reasons for confidentiality including national security interests;
- (x) opportunities will be provided for appropriate and adequate public consultation on environmental aspects of proposals before the assessment process is complete;
- (xi) mechanisms will be developed to seek to resolve conflicts and disputes over issues which arise for consideration during the course of the assessment process; and
- (xii) the environmental impact assessment process will provide a basis for setting environmental conditions, and establishing environmental monitoring and management programs (including arrangements for review) and developing industry guidelines for application in specific cases.

This led to the establishment of the National Environment Protection Council (Schedule 4) and complementary legislation was passed in all jurisdictions.

Schedule 6 of the *Intergovernmental Agreement on the Environment* identifies conservation of biodiversity as an essential principle of environmental protection. There are clear indications that the Commonwealth's international responsibilities will be pursued through forums in which the states and territories are heavily represented.

### **1992 - Convention on Biological Diversity**

On 5 June 1992, Australia signed the United Nations *Convention on Biological Diversity* at the United Nations Conference on Environment and Development at Rio de Janeiro. Australia ratified this signing in 1993 and is committed to conserve genetic, species and ecosystem biodiversity. It is committed to:

- regulate or manage biological resources (including genetic resources and populations) important for the conservation of biological diversity whether within or outside protected areas, with a view to ensuring their conservation and sustainable use;
- control or eradicate those alien species which threaten ecosystems, habitats or species;
- develop necessary legislation and/or other regulatory provisions for the protection of not only threatened species, but also threatened populations;
- identify types of activities likely to have significant adverse impacts on the conservation of biodiversity, monitor the effects of these activities and regulate or manage them; and
- adopt economically and socially sound measures that act as incentives for the conservation of biodiversity.

The *Convention on Biological Diversity* requires that contracting states should:

*Establish a system of protected areas or areas where special measures need to be taken to conserve biological diversity; and*

*Promote environmentally sound and sustainable development in areas adjacent to protected areas with a view to furthering protection of these areas.*

### **1992 - National Strategy for Ecologically Sustainable Development**

In 1987 the World Commission on Environment and Development recognised the world need to implement principles of sustainable development. Australia adopted the concept of sustainable development and produced the *National Strategy for Ecologically Sustainable Development* in 1992.

As such, the Ecological Sustainable Development (ESD) commitment represents one of the greatest challenges facing Australia's governments, industry, business and community in the coming years. While there is no universally accepted definition of ESD, in 1990 the Commonwealth Government suggested the following definition for ESD in Australia:

*using, conserving and enhancing the community's resources so that ecological processes, on which life depend, are maintained, and the total quality of life, now and in the future, can be increased.*

(<http://www.ea.gov.au/national/strategy/intro.html#WIESD>)

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

### **1996 - National Strategy for the Conservation of Australia's Biological Diversity**

The conservation of biological diversity is one of the three core objectives of the *National Strategy for Ecologically Sustainable Development*. The *National Strategy for the Conservation of Australia's Biological Diversity* explicitly takes account of the provisions of the United Nations *Convention on Biological Diversity* and is mainly organised around two spatial scales: continental and bioregional. Activity at the local scale has been subordinated and integrated into the bioregional planning framework (<http://www.ea.gov.au/biodiversity/publications/strategy/index.html>).

Overall responsibility for implementation is assigned to ANZECC, which is to consult with other relevant ministerial councils, monitor the outcomes of the strategy, report to heads of government on implementation and provide five-yearly reviews of its progress. Western Australia is a signatory to the *National Strategy for the Conservation of Australia's Biological Diversity*.

### **ANZECC**

In 1991, Australia and New Zealand Environment Conservation Council (ANZECC) recognized the need for a national approach on EIA.

In 1996, ANZECC developed the *Guidelines and Criteria for Determining the Need for and Level of EIA in Australia*.

In 1997, ANZECC developed the *Basis for a National Agreement on Environmental Impact Assessment*.

### **1999 - Australian Guidelines for Establishing the National Reserve System**

In 1999 the *Australian Guidelines for Establishing the National Reserve System* (Commonwealth of Australia) were prepared to assist government agencies, non-government organisations and the community in the development of the National Reserve System (NRS), and to assist stakeholders in the understanding of this process (<http://www.ea.gov.au/parks/nrs/pubs/nrs-creation-thackway.doc>).

The Guidelines will be applied in the delivery of the National Reserve System Program (NRSP), a program of the Commonwealth Government's Natural Heritage Trust of Australia.

The Guidelines were developed by the National Reserve System Scientific Taskforce of the Australian and New Zealand Environment and Conservation Council (ANZECC). They build upon the framework provided by the Interim Biogeographic Regionalisation for Australia (Thackway and Cresswell, 1995), otherwise known as IBRA, and set out the goals, principles, development, implementation and review procedures for the National Reserve System (NRS).

### **2001 – National Objectives and Targets for Biological Conservation 2001 – 2005**

In 2001, the Western Australian Government was party to the development and release of the *National Objectives and Targets for Biological Conservation 2001–2005*, as a means of acknowledging the need for national objectives and targets. This inter-government agreement establishes a framework for policy and decision-making at both the state and federal levels (<http://www.ea.gov.au/biodiversity/publications/objectives/pubs/notes.pdf>).

### **Legislation (Western Australia)**

The *Wildlife Conservation Act 1950* and the *Conservation and Land Management Act 1984* provide the guidelines and legislation to protect the State's flora and fauna (<http://www.calm.wa.gov.au/>)

Management Plans are required under Part V of the *Conservation and Land Management Act 1984*. Since 1984 the Department of Conservation and Land Management on behalf of the 'controlling bodies' of land under the *Conservation and Land Management Act*, has developed management plans for several geographic regions of Western Australia which set out the broad mechanisms for conservation of biodiversity and management of lands (and waters) within these regions. These plans are required to be revised every 10 years.

In May 1995, clearing controls administered through the *Soil and Land Conservation Act 1945* (<http://www/agric.wa.gov.au>) were extended to provide greater protection for vegetation, including the consideration of nature conservation values in assessing clearance notifications.

### **Policy (Western Australia)**

#### **• EPA Conservation Through Reserves - System Areas**

In the late 1970s a system of conservation through reserves was set up and the State was divided into 12 regions or 'systems'.

For example System 6 (the Darling System), just over 1% of the State's area, contains 80% of the population. It extends from the Moore River in the north to the Blackwood River in the south and as far inland as Toodyay. The System 6 report, released in 1983, contained

conservation recommendations for 209 specific areas, 108 of these in the Perth metropolitan area. The Government accepted the general principles and recommendations of the report and asked that they be implemented as far as possible.

- **1992 - Draft Nature Conservation Strategy**

In 1992 the Department of Conservation and Land Management published the document entitled *Draft Nature Conservation Strategy for Western Australia*. This document aimed to establish objectives and strategies for the conservation of biodiversity in Western Australia.

Since this document was published the Department of Conservation and Land Management has undertaken comprehensive biological surveys of plants and animals in the sandy desert region, Kimberley rainforests, Nullarbor, Eastern Goldfields and Swan Coastal Plain through its biogeography research program. Significant work has also been completed by a range of other government agencies, companies, non government organisations and individuals to further the State's inventory of biodiversity.

The Department of Conservation and Land Management considers that the existing system of national parks and nature reserves is not adequate to ensure the long-term conservation of terrestrial ecosystems. Maintenance of natural areas on private land, vacant Crown land and other vested land such as road reserves is crucial.

- **2000 - Perth's 'Bush Forever' Policy**

This government policy document which was released jointly in December 2000 by the Ministers for Environment, Water Resources and Planning, identifies and sets out broad mechanisms for the management and protection of, areas of bushland within the Swan Coastal Plain portion of the Perth Metropolitan area which are of regional significance for conservation (<http://www.planning.wa.gov.au/>; <http://www.environ.wa.gov.au>). The *Bush Forever* study area is the Swan Coastal Plain portion of the Perth Metropolitan Area, which falls within the EPA's System 6 Study area (Department of Conservation and Environment, 1983).