



The Bioregions of New South Wales

their biodiversity, conservation and history



2 0 0 3

The Bioregions of New South Wales
their biodiversity, conservation and history

2 0 0 3



Photo: J. Little

NSW National Parks and Wildlife Service

Published by the National Parks and Wildlife Service (NSW)

PO Box 1967
Hurstville NSW 2220
Phone: (02) 9585 6444
Fax: (02) 9585 6447

ISBN: 0 7313 6709 X

Authors: Roshan Sahukar, Catherine Gallery, Julianne Smart
and Peter Mitchell
Editor: Irina Dunn

© National Parks and Wildlife Service (NSW) 2003

Designed by Harley & Jones design
Printed by Fast Proof Press
Cover photograph by A. Brown

This report may be cited as:

NSW National Parks and Wildlife Service (2003)
The Bioregions of New South Wales:
their biodiversity, conservation and history
NSW National Parks and Wildlife Service
Hurstville

Acknowledgments

Three of the authors of this document, Roshan Sahukar, Catherine Gallery and Julianne Smart are based in the Conservation Assessment and Priorities Unit of the NSW National Parks and Wildlife Service.

Peter Mitchell is a contractor to the NPWS.

The members of the Technical Working Group for the project, under the State Biodiversity Strategy are:

- Gary Saunders (NPWS)
- Phil Purcell (NPWS)
- Peter Peckham (NPWS)
- Gethin Morgan (Consultant)
- Ric Noble (Planning NSW)
- Mike Cavanagh (NPWS)

Other NPWS staff who provided invaluable assistance to the project are:

- Murray Robinson (maps)
- Lisa Hubbard and Darren James (conservation status statistics)

This NPWS project was partially funded by the NSW State Biodiversity Strategy.



Disclaimer

While every reasonable effort has been made to ensure that this document is correct at the time of printing, the State of New South Wales, its agents and employees, do not assume any responsibility and shall have no liability, consequential or otherwise, of any kind, arising from the use of or reliance on any of the information contained in this document.

Table of contents

List of tables, List of appendices	6
List of acronyms and abbreviations	7
Introduction	
1. Bioregional conservation and the NSW Biodiversity Strategy	9
1.1 What is a bioregion?	9
2. The bioregional and subregional framework	9
3. Aims and objectives of the Bioregional Overviews project	10
4. How to use this document	10
4.1 Location	10
4.2 Climate	10
4.3 Topography	10
4.4 Geology and geomorphology	10
4.5 Geodiversity	10
4.6 Soils	10
4.7 Biodiversity	11
4.8 Regional history	11
4.9 Bioregional-scale conservation	11
4.10 Subregions	11
5. Data and analysis	12
6. Maps	12
7. References	12

CHAPTER 1	
A brief overview of New South Wales	
1. The bioregional landscape of NSW	13
2. Location	13
3. Climate	13
4. Topography and geomorphology	14
5. Biodiversity	14
6. Regional history	14
6.1 Aboriginal occupation	14
6.2 European occupation	16
7. Subregions	18
8. Conservation status	18
8.1 The role of National Parks and Nature Reserves	18
8.2 The role of Wilderness Areas	18
8.3 The role of Flora Reserves	18
8.4 The role of Voluntary Conservation Agreements	19
8.5 The role of Property Agreements	19
8.6 The role of Wildlife Refuges	19
8.7 The role of Regional Parks	19
8.8 The role of Crown Reserves	19
8.9 The role of Historic Sites	19
8.10 The role of Karst Conservation Reserves	19
8.11 The role of Aboriginal Areas	19
9. Representativeness of conservation mechanisms	19
10. Effectiveness of conservation mechanisms	19
11. References	20

CHAPTER 2	
The Simpson-Strzelecki Dunefields Bioregion	
1. Location	21
2. Climate	21
3. Topography	21
4. Geology and geomorphology	22
5. Geodiversity	22
6. Soils	22
7. Biodiversity	22
7.1 Plant communities	22
7.2 Significant flora	23
7.3 Significant fauna	23
7.4 Significant wetlands	23
8. Regional history	23
8.1 Aboriginal occupation	23
8.2 European occupation	23
9. Bioregional-scale conservation	23
10. Subregions of the Simpson Strzelecki Bioregion	24
11. References	24

CHAPTER 3	
The Channel Country Bioregion	
1. Location	31
2. Climate	31
3. Topography	31
4. Geology and geomorphology	31
5. Geodiversity	32
6. Soils	32
7. Biodiversity	32
7.1 Plant communities	32
7.2 Significant flora	32
7.3 Significant fauna	32
7.4 Significant wetlands	33
8. Regional history	33
8.1 Aboriginal occupation	33
8.2 European occupation	33
9. Bioregional-scale conservation	34
10. Subregions of the Channel Country Bioregion	34
11. References	34

CHAPTER 4
The Broken Hill Complex Bioregion

1. Location	41
2. Climate	41
3. Topography	41
4. Geology and geomorphology	42
5. Geodiversity	42
6. Soils	42
7. Biodiversity	42
7.1 Plant communities	42
7.2 Significant flora	43
7.3 Significant fauna	43
7.4 Significant wetlands	43
8. Regional history	44
8.1 Aboriginal occupation	44
8.2 European occupation	44
9. Bioregional-scale conservation	44
10. Subregions of the Broken Hill Complex Bioregion	45
11. References	46

CHAPTER 5
The Mulga Lands Bioregion

1. Location	53
2. Climate	53
3. Topography	53
4. Geology and geomorphology	54
5. Geodiversity	54
6. Soils	54
7. Biodiversity	54
7.1 Plant communities	54
7.2 Significant flora	54
7.3 Significant fauna	54
7.4 Significant wetlands	55
8. Regional history	56
8.1 Aboriginal occupation	56
8.2 European occupation	56
9. Bioregional-scale conservation	56
10. Subregions of the Mulga Lands Bioregion	57
11. References	58

CHAPTER 6
The Darling Riverine Plains Bioregion

1. Location	65
2. Climate	65
3. Topography	66
4. Geology and geomorphology	66
5. Geodiversity	66
6. Soils	66
7. Biodiversity	66
7.1 Plant communities	66
7.2 Significant flora	67
7.3 Significant fauna	67
7.4 Significant wetlands	68
8. Regional history	69
8.1 Aboriginal occupation	69
8.2 European occupation	69
9. Bioregional-scale conservation	69
10. Subregions of the Darling Riverine Plains Bioregion	70
11. References	72

CHAPTER 7
The Murray Darling Depression Bioregion

1. Location	79
2. Climate	79
3. Topography	79
4. Geology and geomorphology	80
5. Geodiversity	80
6. Soils	80
7. Biodiversity	80
7.1 Plant communities	80
7.2 Significant flora	80
7.3 Significant fauna	81
7.4 Significant wetlands	81
8. Regional history	82
8.1 Aboriginal occupation	82
8.2 European occupation	82
9. Bioregional-scale conservation	82
10. Subregions of the Murray Darling Depression Bioregion	83
11. References	84

CHAPTER 8
The Riverina Bioregion

1. Location	91
2. Climate	91
3. Topography	92
4. Geology and geomorphology	92
5. Geodiversity	92
6. Soils	92
7. Biodiversity	92
7.1 Plant communities	92
7.2 Significant flora	92
7.3 Significant fauna	93
7.4 Significant wetlands	94
8. Regional history	95
8.1 Aboriginal occupation	95
8.2 European occupation	96
9. Bioregional-scale conservation	96
10. Subregions of the Riverina Bioregion	97
11. References	98

CHAPTER 9
The Cobar Peneplain Bioregion

1. Location	105
2. Climate	105
3. Topography	106
4. Geology and geomorphology	106
5. Geodiversity	106
6. Soils	106
7. Biodiversity	106
7.1 Plant communities	106
7.2 Significant flora	107
7.3 Significant fauna	107
7.4 Significant wetlands	108
8. Regional history	108
8.1 Aboriginal occupation	108
8.2 European occupation	109
9. Bioregional-scale conservation	110
10. Subregions of the Cobar Peneplain Bioregion	111
11. References	112

CHAPTER 10	
The South Western Slopes Bioregion	
1. Location	119
2. Climate	119
3. Topography	120
4. Geology and geomorphology	120
5. Geodiversity	120
6. Soils	120
7. Biodiversity	120
7.1 Plant communities	120
7.2 Significant flora	121
7.3 Significant fauna	121
7.4 Significant wetlands	121
8. Regional history	121
8.1 Aboriginal occupation	121
8.2 European occupation	122
9. Bioregional-scale conservation	123
10. Subregions of the South Western Slopes Bioregion	124
11. References	124

CHAPTER 11	
The Brigalow Belt South Bioregion	
1. Location	131
2. Climate	131
3. Topography	131
4. Geology and geomorphology	132
5. Geodiversity	132
6. Soils	132
7. Biodiversity	132
7.1 Plant communities	132
7.2 Significant flora	133
7.3 Significant fauna	133
7.4 Significant wetlands	133
8. Regional history	133
8.1 Aboriginal occupation	133
8.2 European occupation	133
9. Bioregional-scale conservation	135
10. Subregions of the Brigalow Belt South Bioregion	136
11. References	138

CHAPTER 12	
The Nandewar Bioregion	
1. Location	145
2. Climate	145
3. Topography	145
4. Geology and geomorphology	146
5. Geodiversity	146
6. Soils	146
7. Biodiversity	146
7.1 Plant communities	146
7.2 Significant flora	147
7.3 Significant fauna	147
7.4 Significant wetlands	148
8. Regional history	148
8.1 Aboriginal occupation	148
8.2 European occupation	148
9. Bioregional-scale conservation	148
10. Subregions of the Nandewar Bioregion	149
11. References	150

CHAPTER 13	
The New England Tablelands Bioregion	
1. Location	157
2. Climate	157
3. Topography	157
4. Geology and geomorphology	157
5. Geodiversity	158
6. Soils	158
7. Biodiversity	158
7.1 Plant communities	158
7.2 Significant flora	159
7.3 Significant fauna	159
7.4 Significant wetlands	159
8. Regional history	159
8.1 Aboriginal occupation	159
8.2 European occupation	159
9. Bioregional-scale conservation	160
10. Subregions of the New England Tablelands Bioregion	161
11. References	164

CHAPTER 14	
The North Coast Bioregion	
1. Location	171
2. Climate	171
3. Topography	171
4. Geology and geomorphology	172
5. Geodiversity	172
6. Soils	172
7. Biodiversity	172
7.1 communities	172
7.2 Significant flora	173
7.3 Significant fauna	173
7.4 Significant wetlands	173
8. Regional history	174
8.1 Aboriginal occupation	174
8.2 European occupation	174
9. Bioregional-scale conservation	174
10. Subregions of the North Coast Bioregion	175
11. References	175

CHAPTER 15	
The Sydney Basin Bioregion	
1. Location	185
2. Climate	185
3. Topography	186
4. Geology and geomorphology	186
5. Geodiversity	186
6. Soils	186
7. Biodiversity	186
7.1 Plant communities	186
7.2 Significant flora	187
7.3 Significant fauna	187
7.4 Significant wetlands	188
8. Regional history	188
8.1 Aboriginal occupation	188
8.2 European occupation	189
9. Bioregional-scale conservation	190
10. Subregions of the Sydney Basin Bioregion	191
11. References	196

CHAPTER 16	
The South Eastern Highlands Bioregion	
1. Location	203
2. Climate	203
3. Topography	203
4. Geology and geomorphology	204
5. Geodiversity	204
6. Soils	204
7. Biodiversity	204
7.1 Plant communities	204
7.2 Significant flora	205
7.3 Significant fauna	205
7.4 Significant wetlands	206
8. Regional history	206
8.1 Aboriginal occupation	206
8.2 European occupation	206
9. Bioregional-scale conservation	207
10. Subregions of the South Eastern Highlands Bioregion	208
11. References	210

CHAPTER 17	
The Australian Alps Bioregion	
1. Location	217
2. Climate	217
3. Topography	218
4. Geology and geomorphology	218
5. Geodiversity	218
6. Soils	218
7. Biodiversity	219
7.1 Plant communities	219
7.1.1 Alpine	219
7.1.2 Subalpine	219
7.1.3 Montane	219
7.1.4 Tableland	219
7.2 Significant flora	220
7.3 Significant fauna	220
7.4 Significant wetlands	220
8. Regional history	220
8.1 Aboriginal occupation	220
8.2 European occupation	221
9. Bioregional-scale conservation	221
10. Subregions of the Australian Alps Bioregion	222
11. References	222

CHAPTER 18	
The South East Corner Bioregion	
1. Location	229
2. Climate	229
3. Topography	229
4. Geology and geomorphology	230
5. Geodiversity	230
6. Soils	230
7. Biodiversity	230
7.1 Plant communities	230
7.2 Significant flora	231
7.3 Significant fauna	231
7.4 Significant wetlands	231
8. Regional history	231
8.1 Aboriginal occupation	231
8.2 European occupation	232
9. Bioregional-scale conservation	232
10. Subregions of the South East Corner Bioregion	233
11. References	234
Glossary	283

List of tables

Table 1	Climate variable information provided for each bioregion	10
Table 2	NSW bioregions and proportion of each within NSW	13

List of appendices

Appendix 1	Diagram of Integrated Biodiversity Conservation Assessment (IBCA) projects funded under the NSW Biodiversity Strategy	241
Appendix 2	The conservation mechanisms surveyed and described in the chapter for each bioregion	242
Appendix 3	Conservation Status analysis of each bioregion in NSW based on protection within formal conservation management mechanisms of landscapes	247

Simpson-Strzelecki Dunefields page 21

Channel Country page 31

Broken Hill Complex page 41

Mulga Lands page 53

Darling Riverine Plains page 65

Murray Darling Depression page 79

Riverina page 91

Cobar Peneplain page 105

South Western Slopes page 119

Brigalow Belt South page 131

Nandewar page 145

New England Tablelands page 157

North Coast page 171

Sydney Basin page 185

South Eastern Highlands page 203

Australian Alps page 217

South East Corner page 229

List of acronyms and abbreviations

ACT	Australian Capital Territory
ANCA	Australian Nature Conservation Agency
CAMBA	China – Australia Migratory Bird Agreement
CAR	Comprehensive, Adequate and Representative
CRA	Comprehensive Regional Assessment
CSA mine	Cornish, Scottish and Australian mine
CSIRO	Commonwealth Scientific and Industrial Research Organisation
DIWA	Directory of Important Wetlands of Australia
DLWC	Department of Land and Water Conservation
DUAP	Department of Urban Affairs and Planning
EIS	Environmental Impact Statement
EPA	Environment Protection Authority
EPA Act	Environmental Planning and Assessment Act (1979)
EPBC Act	Environmental Protection and Biodiversity Conservation Act (1999)
GIS	Geographic Information System
HO	Heritage Office
IBCA	Integrated Biodiversity Conservation Assessment
IBRA	Interim Biogeographic Regionalisation of Australia
JAMBA	Japan – Australia Migratory Bird Agreement
LEP	Local Environment Plan
NPW Act	National Parks and Wildlife Act (1974)
NPWS	National Parks and Wildlife Service
NSW	New South Wales
NVC Act	Native Vegetation Conservation Act (1997)
QLD (Qld)	Queensland
RACAC	Resource and Conservation Assessment Council
RACD	Resource and Conservation Division (Planning NSW)
RAOU	Royal Australasian Ornithologists Union
RVC	Regional Vegetation Committee
SA	South Australia
SCA	State Conservation Area
SCMP	State Conservation Monitoring Project
SEPP	State Environmental Planning Policy
SRA	State Recreation Area
TS Profile	Threatened Species Profile
TSC Act	Threatened Species Conservation Act (1995)
UNESCO	United Nations Educational, Scientific and Cultural Organisation
VCA	Voluntary Conservation Agreement
VIC (Vic)	Victoria
WR	Wildlife Refuge



1. Bioregional conservation and the NSW Biodiversity Strategy

This document provides a series of textual snapshots of the conservation character and significance of the 17 bioregions of NSW. Each chapter presents information on a variety of characteristics of the bioregion, including both physical descriptions and its conservation status.

This report is one of a series of documents which utilise a bioregional framework in the assessment of the terrestrial biodiversity of NSW. It was prepared as part of a suite of projects which were funded under the NSW Biodiversity Strategy and were designed to fill gaps in information and to provide tools for State and bioregional conservation assessment. A diagram showing the relationships between these projects is given in Appendix 1.

The broad aim of the Bioregional Overviews project and associated NSW Biodiversity Strategy projects under the Integrated Bioregional Conservation Assessment (IBCA) package (see Appendix 1 for IBCA projects funded under the NSW Biodiversity Strategy) is to use an integrated, whole-of-government approach in collating and distributing biodiversity data and information in order to adequately assess the conservation significance of land throughout NSW (NSW NPWS 1999a).

This document has been prepared for a diverse readership ranging from high school students to local, State and Federal Governments, as well as industry, including tourism and agriculture, and as an initial source for those preparing more detailed regional conservation assessments and planning. The document offers a description of the unique character of each of the bioregions, and shows how important it is to understand the significance of biogeographic regions (bioregions) in conservation planning. In doing this, we hope to provide a greater understanding of how we describe conservation values and of the challenges ahead for conservation and land management.

1.1 What is a bioregion?

Following the trend of governments throughout Australia, the NSW National Parks and Wildlife Service has adopted a bioregional approach to conserving much of our biodiversity in response to the need to work with large geographic scales and biological cycles to plan and achieve biodiversity conservation.

Bioregions are relatively large land areas characterised by broad, landscape-scale natural features and environmental processes that influence the functions of entire ecosystems. They capture the large-scale geophysical patterns across Australia. These patterns in the landscape are linked to fauna and flora assemblages and processes at the ecosystem scale, thus providing a useful means for simplifying and reporting on more complex patterns of biodiversity.

Planning for biodiversity at this scale recognises the significance of these natural processes and gives us the greatest opportunity to conserve biodiversity in sufficient numbers and distribution to maximise its chance of long-term survival.

Biodiversity is influenced by but does not recognise administrative boundaries, which is another reason to use a bioregional approach to assess all land across the region.

Introduction

Subregions, as described by Morgan and Terrey (1992), are “based on finer differences in geology, vegetation and other biophysical attributes and are the basis for determining the major regional ecosystems”. The subregions that make up each of the bioregions are useful tools in regional conservation planning and in the development of a conservation reserve system that, if it is to be representative of the natural environment, “must contain viable areas of the major ecosystems of each natural region” (Morgan and Terrey 1992).

2. The bioregional and subregional framework

It became apparent in the early 1990s that administrative regions were no longer a satisfactory basis for conservation assessment and planning (Dick 2000). Consequently, the mapping of the bioregions of Australia was undertaken by the Federal Government in cooperation with State and territory conservation agencies to provide a consistent and robust framework for biodiversity assessment and planning.

The result of this Australia-wide mapping exercise was the production of the Interim Biogeographic Regionalisation of Australia or IBRA (Thackway and Cresswell 1995), a system that divides Australia into bioregions on the basis of their dominant landscape-scale attributes. IBRA was developed as a framework primarily to identify deficiencies in the Australian network of protected areas and to set priorities for further enhancing the reserve system (Thackway and Cresswell 1995). The term “interim” is retained in the IBRA title because the bioregions are periodically updated as new or more reliable information comes to hand from a range of biological and environmental surveys (Environment Australia 2000) designed to refine bioregional boundaries. At the time of writing, IBRA Version 5.1 contained the most recent updates.

Across Australia some 130 biogeographic regions had already been identified but there had been little communication or congruency across State and territory boundaries about these regions. The use of datasets and environmental information including climate, lithology, geology, landform, vegetation, flora and fauna, land use and other attributes provided the means of rationalising these 130 regions into 80 biogeographic regions, which were then further refined into the 85 bioregions recognised in Australia today (Thackway and Cresswell 1995, Environment Australia 2000). Of these 85 bioregions, 17 are found in NSW. Two lie wholly within the NSW boundary, while the other 15 are shared with bordering States – Victoria, South Australia and Queensland.

The description of IBRA regions according to their geography and ecology (NSW NPWS 1999a) are, however, more relevant to environmental management than administrative boundaries (such as State borders), which are unrelated to the physical attributes of the Australian landscape. The IBRA bioregions therefore provide a logical and functional framework for conservation management, land use and planning throughout Australia.

Throughout Australia bioregions have been further divided into subregions or provinces. Subregions are based on finer differences in biophysical attributes including geology and vegetation (Morgan and Terrey 1992) and because they provide more detailed information about the landscape they can be used for finer scale planning. Just as the bioregions vary in size, with larger regions, mainly those in arid or semi-arid climates, reflecting less

diverse terrain (Thackway and Cresswell 1995), the size, and therefore the number, of subregions found in each bioregion also varies.

To make decisions about biodiversity we need to understand where species occur, the habitats they occur in and the ecological processes that drive those habitats and larger groupings of communities. Bioregional assessments have occurred only over the last 6 years in NSW, and our bioregional information base is variable but dynamic. Information on biodiversity has been, and will continue to be, gathered at many levels of detail as part of bioregional or statewide assessments or will emerge as a result of more detailed management of individual areas, ecosystems or species.

We can begin to describe and report on the condition of biodiversity in the NSW bioregions although not always as precisely as is needed for detailed land management decisions. This document provides some of the more detailed information on biodiversity for each bioregion at the same time as using less detailed data sets to enable comparisons between bioregions.

3. Aims and objectives of the Bioregional Overviews project

This document aims to provide a series of textual snapshots of the conservation character and significance of the 17 bioregions of NSW. The information collated for the project includes the physical attributes of the landscape and the human links to the environment, as well as the biodiversity and conservation values of each bioregion. The need for the publication of this document is based on the acceptance that it will be some time before the detailed information about the bioregions flowing from other IBCA projects and specific bioregional assessments becomes available.

Land managers and conservation planners need to know what is present in the landscape, where it is and what condition it is in. This information must be known at four scales:

- statewide;
- bioregional;
- ecosystem; and
- species.

The Bioregional Overviews project provides a basis for establishing conservation priorities by offering guidance to conservation planners on setting such priorities at a coarse, bioregional scale.

It is anticipated that this report, *The Bioregions of New South Wales: their biodiversity, conservation and history*, will be periodically updated to incorporate new data when it becomes available. Where no bioregional assessments exist for a bioregion, the bioregional overview will provide an interim, coarse-scale description of the environment and past and present land management to guide decision-making in the bioregion. Data from regions where bioregional assessments are under way can be used to prepare a more comprehensive overview. Where there is a need to examine the inevitable differences arising out of separate regional or bioregional planning processes in adjacent bioregions, this document may provide a basis for doing so. The document will also highlight where bioregional-scale information and data is currently lacking.

4. How to use this document

Each chapter describes one of the 17 NSW bioregions with maps and references relating to that bioregion presented in that particular chapter. The order of the chapters proceeds from a description of the north-western bioregions to those in the south-east of NSW.

Each chapter is divided into the following sections.

4.1 Location

The location section describes the geographical position and area of the bioregion in NSW with reference to:

- major towns and roads;
- major rivers and catchments; and
- shared boundaries with neighbouring States.

4.2 Climate

Details of the climate of each bioregion has been sourced from the Australian Bureau of Meteorology (see References at the end of this chapter for website address). The short description of the broad climatic characteristics of each bioregion provided in each chapter is based on the *Objective Classification of Australian Climates* (Stern *et al.* 2000).

Also provided are figures for the climate variables as shown in Table 1 below.

4.3 Topography

The topography section describes the characteristic landscape features, or shape of the landscape of the bioregion.

4.4 Geology and geomorphology

The geology and geomorphology section describes the dominant underlying geology or rock types for each bioregion as well as the major geomorphic events leading to the development of the landscape we see today.

Because geomorphic events are generally at a larger scale than the bioregional level, it is important to get a sense of the geomorphic landscape of each bioregion in a state-wide or even continental context. For this reason, an outline of the major events which led to the formation of the major landscape features of NSW is provided in Chapter 1 “A brief overview of New South Wales”.

4.5 Geodiversity

The geodiversity section gives a brief overview of the main features of geological and/or geomorphic interest in each bioregion.

4.6 Soils

The soils section describes the main soil types found in the bioregion, the geology from which they are derived and that part of the landscape in which they are usually found.

Mean Annual Temperature	Minimum Average Monthly Temperature	Maximum Average Monthly Temperature	Mean Annual Rainfall	Minimum Average Monthly Rainfall	Maximum Average Monthly Rainfall
-------------------------	-------------------------------------	-------------------------------------	----------------------	----------------------------------	----------------------------------

Table 1. Climate variable information provided for each bioregion (derived from the Australian National University – Centre for Resource and Environmental Studies ANUCLIM 5.1 software package of programs that enable the user to obtain estimates of monthly climate variables)



Photo: J. Little

4.7 Biodiversity

The biodiversity section is divided into the following subheadings:

- Plant communities
This section describes the major plant communities found in the bioregion.
- Significant flora
This section describes significant flora, particularly those listed in the schedules of the NSW *Threatened Species Conservation (TSC) Act (1995)* and the Commonwealth *Environmental Protection and Biodiversity Conservation (EPBC) Act (1999)*, including endangered ecological communities and endangered and vulnerable populations and species.
- Significant fauna
This section describes significant fauna found in the bioregion, in particular species or populations listed in the schedules of the *TSC Act (1995)* and *EPBC Act (1999)*.
- Significant wetlands
Wetlands are better defined by catchment boundaries than by bioregional boundaries. None the less, information on the wetlands of each bioregion has been included for those interested in planning or working at the bioregional scale. New information gathered as part of the Australian Terrestrial Biodiversity Assessment (2002) is included in this section.

Invertebrates have not been extensively surveyed across NSW or generally across Australia and therefore little is known about them in comparison to the number of invertebrate species predicted to occur. There is invertebrate information available for some bioregions, however it has not been included here as surveys had not been completed at the time of writing.

4.8 Regional history

The regional history section describes the interaction between humans and the bioregional landscape as well as the cultural significance of the bioregional landscapes and the influence humans have had on bioregional biodiversity.

The regional history section of each chapter is divided into two parts:

- Aboriginal occupation
This section includes the main Aboriginal language groups that occupy the bioregion or have historically lived in that bioregion. There is much overlap between areas inhabited or visited by the different language groups in the Western Division, and for this reason a summary of the Aboriginal occupation of the Western Division is provided separately in Chapter 1 “A brief overview of New South Wales”. Under the heading “Aboriginal occupation” in the chapters on bioregions located in western NSW, the reader will be prompted to return to this section in Chapter 1 to read about the Aboriginal heritage of that bioregion.
- European occupation
This section provides a brief account of early exploration and European settlement, major historic events and development of the main towns in a particular bioregion and their socio-economic basis. An account of European heritage in the Western Division bioregions is provided separately in Chapter 1 “A brief overview of New South Wales” and the reader will be prompted in this section in the chapters on western NSW bioregions to return to Chapter 1 to read about the European history of that bioregion.

4.9 Bioregional-scale conservation

The goals of the NSW National Parks and Nature Reserve system are to protect comprehensive, adequate and representative samples of all natural landscapes in the system. That is, they aim to protect the full variety of ecosystems with sufficient size and condition to remain viable for hundreds of years. However, to achieve truly adequate protection of ecosystems so that they sustain natural processes well into the distant future, there is a need to focus on complementary conservation of landscapes outside the National Parks and Nature Reserve system.

A range of conservation mechanisms are available to achieve conservation in NSW and are outlined in Appendix 2. The role of these mechanisms in the conservation of landscapes has been reviewed to provide a simple (but until now never undertaken) comparison of conservation and conservation-oriented land management mechanisms in and across bioregions. A review of the conservation mechanisms available in each bioregion is documented in this section of every chapter.

It should be noted that only mechanisms with a state-wide legislative basis were surveyed. Of the range of legislatively based conservation mechanisms, only those with state-wide data available at the time of writing were analysed. It should also be noted that a new category of reserve that has been recognised in legislation, the State Conservation Area, was not analysed as none had been gazetted at the time of analysis.

4.10 Subregions

Although the aim of this document is to provide a general overview of the bioregions of NSW, we have included a description, based on the work of Morgan and Terrey (1992) and Morgan (2001), of the finer-scale subregions that make up each bioregion.

5. Data and analysis

The data used to describe the conservation status of each bioregion were provided from analysis undertaken by the State Conservation Monitoring Project (SCMP). Not all conservation mechanisms analysed are mutually exclusive, and there is some overlap. This means that figures cannot simply be aggregated to provide accurate protected area totals for all programs. While areas and percentages for the majority of mechanisms are generally not accurate to two decimal places, we have included data to this level of accuracy to show the contribution made by small but important initiatives such as Wildlife Refuges, Voluntary Conservation Agreements and Property Agreements.

The area of each bioregion has been derived from IBRA version 5.1 and analysed. These areas may not perfectly match the areas of the bioregions calculated from the SCMP because of variations in grid size. 1km grid cells were used in the SCMP to calculate the area of landscapes and both vegetated and cleared areas of the bioregion.

The NSW Listing of Ecosystems was developed by the Conservation Assessment and Priorities Unit of the NPWS and Groundtruth Consulting as part of the NSW Biodiversity Strategy. The conservation status of the western bioregions was derived using the mapped landscape units resulting from the NSW Listing of Ecosystems project. At the time of analysis, this landscape mapping (Mitchell in prep) was not complete for the east of the State, so an alternative landscape classification (NPWS in prep) was used as the basis for the statistics for the eastern bioregions. Further details on data sets and analysis can be obtained from the State Conservation Monitoring Project (NPWS in prep).

Chapters describing the western NSW bioregions (with conservation status statistics based on Mitchell (in prep) landscape mapping) are placed close together in this report and eastern NSW bioregions are located together (with conservation status statistics based on NPWS (in prep) landscapes classification). A map of the location of protected areas in each bioregion is contained in the chapter for that bioregion. It should be noted that these maps do not indicate the locations of Voluntary Conservation Agreements, Wildlife Refuges or Property Agreements in order to protect the privacy of the landholders involved.

Finally, figures provided in the conservation status section of each chapter apply to the NSW portion of the bioregions only. As the majority of bioregions in NSW extend across the borders of adjoining States, the data provided is insufficient to give a complete picture of the bioregions for the purposes of bioregional planning across State administrative boundaries.

We hope in the future to be able to incorporate a more complete and comprehensive analysis of the whole of each bioregion.

6. Maps

There are six maps provided for each bioregional chapter. These are:

- Location map showing the main towns and roads;
- Topographic map;
- Rivers map showing other main water bodies and Catchment Management Board Areas;
- Vegetation map showing areas with vegetation cover and areas cleared in the bioregion;
- Protected Areas map showing areas managed under different conservation mechanisms such as National Parks and Nature Reserves; and
- Map of subregions and landscapes of each bioregion.

7. References

Australian Bureau of Meteorology website – www.bom.gov.au

Australian Terrestrial Biodiversity Assessment 2002. National Land and Water Resources Audit, Canberra.

Dick, R. (ed) 2000. A multi-faceted approach to regional conservation assessment in the Cobar Peneplain biogeographic region – an Overview. NSW National Parks and Wildlife Service, Hurstville.

Environment Australia 2001. *A Directory of Important Wetlands of Australia*, Third Edition, Environment Australia, Canberra.

Environment Australia 2000. *Revision of the Interim Biogeographic Regionalisation for Australia (IBRA) and development of Version 5.1 – Summary Report*. Environment Australia, Canberra.

Morgan, G. 2001. *Delineation and description of the Eastern Environmental Subregions (provinces) in New South Wales Study*. NSW National Parks and Wildlife Service, Hurstville.

Morgan, G. and Terrey, J. 1992. *Nature conservation in western New South Wales*. National Parks Association, Sydney.

NSW National Parks and Wildlife Service 1999a. *NSW State Biodiversity Strategy*. NSW National Parks and Wildlife Service, Hurstville.

Stern *et al.* 2000. *Objective Classification of Australian Climates*. Australian Bureau of Meteorology, Melbourne.

Thackway, R. and Cresswell, I.D. 1995. *An interim biogeographic regionalisation for Australia: a framework for setting priorities in the National Reserves System Cooperative Program, Version 4.0*. Australian Nature Conservation Agency, Canberra.