

## CHAPTER 1

# A brief overview of New South Wales

### 1. The bioregional landscape of NSW

The diversity of NSW landscapes is evident in the wide range of the State's bioregions. Those bioregions in western NSW represent sandy deserts (Simpson Strzelecki Dunefields, Channel Country, Murray Darling Depression), riverine plains (Riverina, Darling Riverine Plains), rocky ranges (Mulga Lands, Broken Hill Complex) and rolling downs (Cobar Peneplain). Towards the east of the State there are lush rainforests (NSW North Coast, South East Corner), rugged mountains (Sydney Basin, New England Tableland, Australian Alps, South Eastern Highlands), undulating ranges (Brigalow Belt South, Nandewar) and fragile, wooded grasslands (NSW South Western Slopes).

The 17 bioregions found in NSW vary considerably in the types of natural values they contain, and although they all have some representation in protected areas, there is great variation in the extent of each reserved. The bioregion with the highest proportion reserved is the Australian Alps Bioregion, with almost 90% protected. The reason for this high proportion is the prevalence of the alpine environs of Kosciuszko National Park, which dominate this bioregion. This provides a major contrast to bioregions such as the Riverina and Darling Riverine Plains Bioregions, where less than 1% of each lie within protected areas.

### 2. Location

NSW has a total area of 80,160,000 hectares (801,600 square kilometres). The Macintyre and Dumaresq Rivers form part of the State boundary with Qld, while the Murray River forms part of the southern NSW-Victorian boundary. Seventeen of the 85 Australian bioregions are represented in NSW, but only 2 of these 17 bioregions lie wholly within the NSW boundary, while the other 15 are shared with the bordering States: Victoria, South Australia and Queensland. An outline of the NSW bioregions, their total areas and the States they occupy are shown in Table 2. The bioregion with the largest area in NSW is the Darling Riverine Plains Bioregion.

### 3. Climate

NSW is described as being in the temperate zone although the climate undergoes large variations depending on proximity to the coast and mountains (EPA 1997). The temperature can be very high in the north-west of the State and very cold in the southern alpine regions, but the climate across NSW is generally mild. Long-term median rainfall varies from a low of 200 mm in the arid north-west of the State to a high of more than 1,500 mm along the north-east coast (EPA 1997). This describes a general trend, with rainfall decreasing from the east to the west of NSW.

IBRA Bioregion	Australian States and Territories	Total NSW area (ha)	% of bioregion in NSW
Australian Alps	NSW, ACT, VIC	428,760	54.07
Brigalow Belt South	NSW, QLD	5,338,619	19.83
Broken Hill Complex	NSW, SA	3,819,374	66.97
Channel Country	NSW, QLD, SA	1,428,032	5.01
Cobar Peneplain	NSW	7,350,084	100.00
Darling Riverine Plains	NSW, QLD	9,398,531	88.23
Mulga Lands	NSW, QLD	6,553,109	25.90
Murray Darling Depression	NSW, SA, VIC	8,046,458	40.74
Nandewar	NSW, QLD	2,070,128	76.71
New England Tablelands	NSW, QLD	2,861,145	95.24
North Coast	NSW, QLD	5,694,360	96.11
South Western Slopes	NSW, VIC	8,087,580	93.24
Riverina	NSW, VIC	7,102,727	74.07
Simpson Strzelecki Dunefields	NSW, QLD, SA	2,116,501	7.19
South East Corner	NSW, VIC	1,300,742	48.15
South Eastern Highlands	NSW, ACT, VIC	4,894,488	55.98
Sydney Basin	NSW	3,632,890	100.00

**Table 2.** NSW bioregions and proportion of each in NSW (Based on figures from IBRA Version 5.1 adapted from Thackway and Cresswell 1995, Environment Australia 2000.)

#### 4. Topography and geomorphology

Topography, geomorphology and geomorphic history are usually linked to large, sometimes continental-scale, events. For this reason, the following summary of the major events in the formation of the landscape of NSW has been provided.

##### Gondwana

“The land masses of the world were once aggregated into a single supercontinent called Pangea. Eventually Pangea separated into two parts, Laurasia to the north and Gondwana to the south. Gondwana comprised South America, Africa, Madagascar, Antarctica, Australia and New Zealand and some now northern lands including India, Turkey and Arabia. Gondwana started to break up into smaller continents about 180 million years ago. Fifty million years ago Australia broke away from Antarctica, severing its last links with the other great lands of Gondwana.” (White 1986)

##### Major events in the formation of the landscape in NSW

NSW contains three main topographical divisions, as follows:

1. The Great Dividing Range comprising the Eastern Highlands, the Great Escarpment and the Western Slopes
2. The Far West Uplands
3. The Western Plains lying in between.

The eastern half of the State comprises thick sequences of sedimentary and metamorphic rocks that were intruded by granites and folded and faulted while the continent was part of Gondwana. Thick piles of less deformed sediments accumulated in the Murray, Sydney and Great Artesian Basins. Subsequently the whole east coast and Great Dividing Range was created by earth movement warping up a gentle arch along the eastern edge of the continent. This was associated with the opening of the Tasman Sea and Southern Ocean during the break-up of Gondwana.

This break-up was accompanied by volcanic activity in some places, and the short steep rivers flowing to the Pacific rapidly eroded the eastern slopes to produce the steep and rugged escarpments and deep gorges that run behind the coast. Geomorphically, the western slopes can be seen as a dissected ramp that links the uplifted highlands with the western plains. The Great Dividing Range is an elevated region of gently undulating country or broad plains, with the exception of areas of dramatic gorge country associated with the Great Escarpment (Packham 1969).

The Western Plains are vast areas of shallow riverine sediment deposited by streams ancestral to the Murray-Murrumbidgee in the Riverina and the Darling and its tributaries in the Darling Riverine Plain. The plains slope gently west from the Great Dividing Range and lie against the eroded bedrock plateau and low ranges of the Cobar Block and the Barrier Ranges. The extensive sand sheets and dunefields of the Murray Basin cover bedrock in the south-western corner of the State.

The Western Plains experienced very little total uplift, but here and there in the Far West Uplands there has been some post-Miocene faulting.

#### 5. Biodiversity

The definition of “biodiversity” adopted by the NSW Biodiversity Strategy is:

*The variety of life forms, the different plants, animals and microorganisms, the genes they contain, and the ecosystems they form. It is usually considered at three levels: genetic diversity, species diversity and ecosystem diversity.*

Simply, biodiversity can be described as life’s variety (NSW NPWS 1999a).

Australia’s native biodiversity is significant at a global scale (NSW NPWS 1999a) and it is estimated that Australia supports more than one million species of plants and animals. As well as a high number of species, Australia, and even NSW alone, also supports a great number and diversity of natural environments from the mountains to the coast, to woodlands, grasslands, rainforests and deserts (NSW NPWS 1999a).

Knowledge of terrestrial biodiversity across NSW varies according to the research effort put into a particular area. To enable comparison across bioregions, the datasets used were generally consistent across the State and for this reason may not have been the most sophisticated available for each region. This has led to a focus on elements of biodiversity such as threatened fauna and flora, which is but one way of describing biodiversity, and other information needs to be considered to gain a better overall picture of the status of biodiversity and its management across a bioregion.

The rich biodiversity contained in a variety of NSW landscapes cannot be taken for granted, and more than 700 species of plants and animals are listed as threatened in NSW under Schedules 1 and 2 of the *Threatened Species Conservation Act, 1995* (TSC Act) (NSW NPWS 1999b). The conservation of these species is crucial in maintaining biodiversity, yet the list of threatened species continues to grow. In NSW, more than 40 fauna and 40 flora species are presumed extinct; more than 40 fauna and 210 flora species are endangered; and more than 160 fauna and 190 flora species are vulnerable (NSW NPWS 1999b).

Of the species listed as endangered or vulnerable in the TSC Act, four reptiles, seven birds, six mammals and almost 300 plants are also listed in the Commonwealth *Environment Protection and Biodiversity Conservation Act, 1999* as threatened nationally.

An endangered ecological community is an assemblage of native species that is likely to become extinct in NSW if threats continue (EPA 1997). At the time of writing, there were 28 ecological communities listed as endangered in NSW on the schedules of the TSC Act. The Sydney Basin Bioregion, for example, contains several of the State’s endangered ecological communities. The majority of endangered ecological communities are listed because they are highly fragmented and hence their long-term viability is threatened (EPA 1997).

#### 6. Regional history

##### 6.1 Aboriginal occupation

Aborigines have lived in the area known as NSW for at least 45,000 years and traditionally there are more than 38 Aboriginal language groups. The Aboriginal heritage of each bioregion is described in the chapter for that bioregion, except for those bioregions in the Western Division of NSW where the overlap of language groups required a broad description as provided in the following account by way of background information.

### Aboriginal Occupation of the Western Division

(This section is largely based on HO and DUAP 1996: Chapter 16 of *Regional Histories of New South Wales*.)

The NSW Western Division, effectively bisected by the Darling River, was traditionally home to around 15 major Aboriginal groups. Many of these groups lived along the rivers of the Western Division, the Barwon, Darling, Lachlan, Murray, Paroo and Warrego Rivers, which provided Aboriginal people with more reliable and plentiful food supplies than those people living away from the major rivers in the scrub country and mallee (HO and DUAP 1996).

The Wiradjuri language group, whose homeland was traditionally centred on the area south of Cobar on the Lachlan River, reached their westernmost extent along the Lachlan through the Riverina Bioregion to the junction of the Lachlan and Murrumbidgee Rivers. Adjacent to this homeland in the north-west of the Riverina Bioregion and south-east of the Murray Darling Depression were the traditional lands of the Jitajita. The Kureinui people lived along the northern bank of the Murray and west to where the Darling joins, while further west were the traditional lands of the Maraura. The Maraura hunted over the border in the South Australian mallee each winter (HO and DUAP 1996) and were also known as Wiimbaio (Berndt and Berndt 1964). The Barkindji people were predominant around the lower Darling, which they called the Barka, Barkindji literally meaning “Darling folk”. The homelands of the Barkindji extended from what is now Wentworth in the Riverina Bioregion, northward through the Murray Darling Depression Bioregion and into the Darling Riverine Plains Bioregion beyond Wilcannia (HO and DUAP 1996). Barkindji homelands were known to extend into Queensland via the Paroo due to the friendly relations they had with the Parundji people of the Darling Riverine Plains Bioregion (HO and DUAP 1996). The home of the Parundji was the banks of the Paroo River, although unlike the Murray and Darling River groups, they did not use the rivers for transport in bark canoes.

The mid-Darling was traditionally occupied by the Naualko people on the west bank near the Warrego junction in the Mulga Lands Bioregion. Further upstream near Bourke and Brewarrina, the Ngemba people occupied the east bank of the Darling in the Darling Riverine Plains, while the Baranbinja and Ualarai people lived on the west bank of the Darling in the Mulga Lands Bioregion (HO and DUAP 1996). The Darling River was a less reliable water source than the Murray and because of this the use of fishing equipment is more elaborate. The fish-traps built by the Ngemba in the river near Brewarrina provide a good example of the innovations by the local Aboriginal people in water management, as does the stone dam built by Aborigines just downstream of the Darling-Warrego River junction (HO and DUAP 1996).

Other Aboriginal groups of the Western Division were not wholly reliant on the rivers, accessing them only in times of drought or extreme heat. From the Lachlan to the east bank of the Darling River was the homeland of the Barindji (not Barkindji) and the Wongaibon, and to the west in the corner country were further groups.

The Karenggapa people traditionally occupied the far north-west corner of NSW in the Channel Country Bioregion at the Queensland border (HO and DUAP 1996). The Maliangapa people occupied the area around the seasonal lakes south of Tibooburra and, like the Karenggapa, were more likely to travel north or west rather than join the people of the Murray-Darling on the rivers (HO and DUAP 1996). However, further south in the

Broken Hill Complex Bioregion the Wiljakali people traditionally occupied the lands around Broken Hill (HO and DUAP 1996) and visited the Barkindji people on the Menindee Lakes in the Darling Riverine Plains Bioregion each year.

Just as the majority of Aboriginal groups populated the areas close to water, early European settlement in the west began with the rivers, and so it was the Aboriginal people of the far west and mallee regions who survived the longest with little European disturbance. The Barindji people east of Menindee are one example, living their traditional lives into the 1850s without interruption. The river groups such as the Barkindji were much less fortunate, losing their traditional lands and hence their existence as hunters and fishers as early as the 1830s. Although the Barkindji resisted European attempts to invade their country – and were, for a while, successful, they were soon to lose their rightful place in the landscape (HO and DUAP 1996).

Once European settlement was well under way in the west, Aborigines on the Murray River began working on stations and were often responsible for the transportation of wool bales in their bark canoes along the rivers south to the Victorian markets (HO and DUAP 1996).

The riverboat trade began on the Murray and Darling Rivers around 1853, at which time the lifestyles of the river people were disturbed irreversibly. Aboriginal people were then employed as timber cutters, the timber used as fuel to power the steamers’ boilers. When a steamboat, the “Gemini”, made its maiden voyage on the upper Darling in 1859, it soon encountered the Ngemba fish-traps at Brewarrina, which stopped its progress – but not for long. The traps were dismantled in part and by the 1870s, with the right water levels, steamboats could reach as far upstream as Walgett in the Darling Riverine Plains Bioregion.

Aboriginal men of the west were also employed as shearers and cattlemen on many of the stations during the 1860s and 1870s, while Aboriginal women were employed as domestic helpers in homesteads, sometimes bearing settlers’ children (HO and DUAP 1996).

By this time – the 1870s – only the Aboriginal people of the most arid areas retained, for the most part, their traditional lifestyles. However, traditional lifestyles required mobility over large areas of the landscape to use the products which the Aborigines needed to subsist. The European presence did not allow this mobility and the range of the Aborigines was restricted to such an extent that there was no choice for them but to relinquish their traditional ways and turn to missions and stations simply in order to exist (HO and DUAP 1996).

The struggles of station owners from the 1890s due to droughts and harsh conditions on the land also adversely affected the Aboriginal tribal groups of the west and as a result their populations rapidly declined. As they left the stations, Aboriginal reservations were created to provide them with accommodation, mainly in tents. These reservations came under the jurisdiction of the Aborigines’ Protection Act, 1909 at such places as Pooncarie (near Menindee), Milparinka, Tibooburra and White Cliffs. The influenza epidemic in 1919 all but destroyed the remainder of the Aboriginal population of the west and those who survived were placed on a new reserve near Menindee in the 1930s. The remaining community of 70 Maliangapa people still living in their traditional corner country in 1936 was trucked east to Brewarrina against its will.

## 6.2 European occupation

European land settlement commenced in NSW in 1788 when Governor Phillip claimed possession of the land for a penal colony on behalf of the British Government. The historic accounts of the bioregional areas are diverse and detailed in the chapters on each bioregion. Further information on the European occupation of the Western Division bioregions is provided below.

(This section is largely based on HO and DUAP 1996: Chapter 16 of *Regional Histories of New South Wales*.)

Charles Sturt approached western NSW from South Australia in 1829, returning in the 1840s, while Thomas Mitchell approached from the north-east in 1835 (HO and DUAP 1996). The intensification of the squatting era in the 1840s occurred after squatters followed in the path of the explorers of the previous decade. Squatting continued until nearly 1900 (Denny 1994). The route often taken by overlanders, from the Namoi south to the Murray via the Barwon and Darling, required regular supplies and this prompted the birth of several small towns along the way (HO and DUAP 1996). By the mid-1840s, river frontages on the western section of the Murray and the lower Darling supported several pastoral stations. Aiding the development of these towns, the Commissioner of Crown Lands held offices first at Balranald in the late 1840s and later at Euston after 1853 (HO and DUAP 1996).

East of Bourke along the Upper Darling, settlement spread in the 1840s from the pastoral regions already established in the east, towards the west and north-west along the Bogan, Castlereagh, Namoi and Gwydir Rivers of the Darling Riverine Plains Bioregion (HO and DUAP 1996). The best grazing land was occupied along the Barwon and Mooni Rivers by 1850 and by 1859 on the east bank of the Warrego River and along the rivers up to and beyond the Queensland border. The arid area between the Culgoa and Warrego Rivers became occupied during the “land boom” of the early 1860s (HO and DUAP 1996).

Cattle remained the most significant element of the pastoral industry up to 1860. Sheep were present but were consistently outnumbered by cattle and since it appeared they could subsist on smaller land areas per head, were allocated much less land than cattle. While cattle comprised the dominant industry of the time, wool production was of significance in the 1850s, with local Aborigines an important part of this industry, using canoes to ferry wool across the Murray.

Steamboats began operating on the Murray in 1853 and their range was extended to the Darling in 1859. Although the Darling had been relatively ephemeral in the past, it was unusually full from this time and allowed riverboats to travel as far upstream as Brewarrina and beyond. Riverboats were known even to reach Queensland from the Darling via the Paroo River during times of flood. Wool was transported to the Victorian town of Echuca, where the riverboat route linked with the Victorian railway, and also by riverboat to Goolwa in South Australia. When the railway from Sydney reached the upper Darling in 1885, riverboats turned instead to Bourke and thus this town became an important destination for trade, continuing as the destination for wool trade until 1931 (HO and DUAP 1996).

The riverboat trade – and the movement of cattle overland before this – led to the development of several towns along the major rivers of the Western Division during the 1850s and 1860s. The Murrumbidgee saw the settlement of Balranald (gazetted in 1851), Hay (1859) and Maude (1861) in the Riverina Bioregion; Wentworth (1859) in the Riverina Bioregion and Menindee (1863) sprang up on the lower Darling in the Darling Riverine Plains Bioregion along with Wilcannia (1866) on the central Darling. The settlement of the towns of Walgett, Bourke, Brewarrina and Collarenebri occurred on the upper Darling and Barwon in the Darling Riverine Plains Bioregion from the late 1850s to mid 1860s. All of these towns remained fairly small even with the booming riverboat trade.

Like Aboriginal people before them, the new settlers were reluctant to inhabit vast areas of the Western Division away from the major rivers, due to unreliable access to water. Dams were attempted but were not often an option as the western plains lacked the rock formations offered by the land to farmers in the east (HO and DUAP 1996). In the north of the Darling Riverine Plains Bioregion, attempts were made around 1873 to dam the Narran River, but the river rebelled, refused orders to desist and within a few years had found an alternative route, defiantly bypassing the dammed section.

Other elements of the landscape were not so assertive, or had no escape from the control imposed by the settlers. For example, the red soils characteristic of the west quickly succumbed to trampling and compaction by grazing animals (HO and DUAP 1996). Graziers in the Bokhara River channel country near the Queensland border saw this change to the land favourably as it meant rainfall runoff reached the channels more readily. However, the improved flow in the channels wasted a lot of water and, ironically, compaction inhibited the growth of feed for the very stock that had trampled it in the first place.

Groundwater was available to some stations such as Kinchega station around Menindee Lakes in the lower Darling, which had access to the overflow lakes and flood channels near the Darling. The availability of water allowed the station to support around 143,000 sheep on 400,000 ha in the 1880s and the station employed many of the Barkindji people as shepherds (HO and DUAP 1996). Control of the water resources of the area allowed transportation of wool bales by water to the Darling.

The late nineteenth century brought innovations which helped to solve the water problem of the west. Wells were sunk in the 1860s along the stock route between the Darling and the Lachlan by the Public Works Department, which also made gradual improvements to water facilities in the far west. Graziers also sunk wells but salinity always caused problems: five out of six wells sunk on the western plains in the 1880s reached salt water at less than a depth of 30 metres (HO and DUAP 1996). The discovery of an extensive underground catchment – the Great



Artesian Basin – near Bourke around 1878, led to changes in the access to and use of water. From then on this vast water resource deep underground could be used for watering stock and, along the Lachlan and Murrumbidgee where the water was less saline, for irrigation (HO and DUAP 1996).

The artesian bores were particularly important resources from the 1880s to the graziers and overlanders in the west. The government sank bores from Bourke west through the Mulga Lands Bioregion to Wanaaring on the Paroo (HO and DUAP 1996). Across the west graziers sank private bores throughout the 1880s although, as happened with ordinary wells, these did not always yield bore-water. By 1895, this widespread bore sinking led the *Pastoral Review* to publish a regular column titled “Boring Notes”.

This reliable and seemingly unlimited water source changed the settlement of the west, giving landholders and industry the confidence to expand. In fact, this access to water in the far west enabled the significant mineral discoveries of the corner country at Tibooburra, Milparinka and of course, Broken Hill (HO and DUAP 1996).

By 1910 there were 364 artesian bores in NSW, which every day harnessed about 500 million litres of water from the Basin. Since then, the number of bores has increased although the total amount of water flowing has progressively decreased, falling by 35% between 1915 and 1958 (HO and DUAP 1996). In the north, where the water is least saline, the Basin still provides the water supplies for the towns of Walgett and Lightning Ridge.

The discovery and exploitation of the Great Artesian Basin, although an immense advantage for the graziers of the west, spelt trouble for the landscape. Access to so much water encouraged overstocking, and just prior to the devastating drought of the 1890s, the western plains supported about 15 million sheep. Sandstorms intensified by erosion due to overstocking caused silt to block tanks and channels. This increased the expenses of installation and maintenance of the bores and drained the economic resources of local graziers (HO and DUAP 1996). Rabbits, encouraged by the plentiful water supply, ran rampant in the west, competing with the stock for food. By 1902 sheep numbers on the western plains had dropped to five million, one-third of their former magnitude.

The Western Division, as well as its Central and Eastern counterparts, was a creation of the Crown Lands Act, 1884. Economic and social collapse during the drought and recession of the 1890s (Cambell 1994) prompted a Royal Commission into the Western Division which repealed the *Crown Lands Act* and conceived the *Western Lands Act*, 1901.

The aim of the Western Lands Act was to manage and control the western land resource, and included the creation of a lease system to enable rural and urban development in the Western Division of NSW. This established a system of leasing and administering land that was more relevant to the western landscape than land management undertaken previously in the Western Division. Most of the land in the Division is held under perpetual leasehold as Western Lands Leases from the Crown for the purpose of grazing, with some small areas held under Special Leases for agriculture, freehold or in reserves (Cambell 1994, Hyder Consulting 1999). The Act does not apply to freehold land in the Western Division. Since its inception, the Act has undergone several reviews designed to re-evaluate its direction and implement improvements to its functionality, the most recent being in 1999 (Hyder Consulting 1999).

The Western Division of NSW covers around 32,500,000 hectares or 42 per cent of the State (Hyder Consulting 1999). The boundary of the Division traverses the Darling Riverine Plains, Cobar Peneplain, Riverina and Murray Darling Depression Bioregions. The Western Division boundary has mainly leasehold lands to the west and freehold lands to the east and this results in fairly significant differences in the management and subsequent condition of land on either side of the boundary. The Central Division lands to the east have been extensively cleared and intensely cultivated compared to the Western Division lands (Masters and Foster 2000). Dryland and irrigated agriculture has become more common in recent years, particularly along the rivers of the Western Division (Hyder Consulting 1999).

The landscapes of the Western Division are diverse, having adapted to the semi-arid climate of high summer temperatures coupled with low and irregular rainfall. Inappropriate land management of the Western Division in the past has led to degraded habitats and loss of species (Hyder Consulting 1999). In 1996 the population of the Western Division was 52,830, a figure which had declined by more than 5,000 in the preceding 15 years, a loss attributed mainly to the decline of mining in the Broken Hill area. However during this time, the Aboriginal population had increased by about 65 per cent to around 5,000 (Hyder Consulting 1999).

The most recent Western Lands Review was established to “identify issues impacting on long term sustainable management and recommend actions to enhance such management” as well as to “resolve land administration problems and to develop greater flexibility in rural land use” in the Western Division (Hyder Consulting 1999).

## 7. Subregions

A description of the subregions of each bioregion is presented in a table in each chapter. These descriptions are based on the work of Morgan and Terrey (1992) and Morgan (2001). The subregions are a major natural land-use planning unit that can assist in conservation planning at a regional scale.

## 8. Conservation status

There is such a wide variety of conservation mechanisms and programs available, that when comparing their effectiveness in conserving the range of landscapes across the State, we need to consider the following:

- the date that the mechanism/program commenced; for example, the Wildlife Refuge program in NSW has been in existence for a much longer period of time than the Voluntary Conservation Agreement program or the Property Agreement program;
- accompanying incentives for private land programs; for example, the Voluntary Conservation Agreement program has generally not been accompanied by the financial and other incentives that accompany the Property Agreement program but is important for conserving cultural heritage as well as biodiversity which the Property Agreement program is not;
- the scope of the program; for example, National Parks protect a broad range of natural features but mechanisms such as Karst Conservation Reserves, Aboriginal Areas and Historic Sites have a more specific focus.

For these reasons we have described what is achieved in terms of the representation of landscapes in these mechanisms but have not necessarily found it useful to use this information alone to compare the effectiveness of different programs.

### 8.1 The role of National Parks and Nature Reserves

National Parks and Nature Reserves have the highest security (are permanently reserved) and are managed primarily for conservation. (Flora Reserves are also important in this regard although some Flora Reserves may permit mining.)

National Parks and Nature Reserves occur in all of the NSW bioregions. National Parks and Nature Reserves generally protect the largest area of land and the largest range of landscapes in each bioregion. The exceptions are the Darling Riverine Plains and Riverina bioregions, where Wildlife Refuges contain more land and a greater range of landscapes than in the National Park and Nature Reserve system. In the Channel Country and Mulga Lands bioregions, National Parks and Nature Reserves make a greater contribution in terms of area, while the Wildlife Refuge program contributes to the management of a greater variety of landscapes.

In the NSW Australian Alps, National Parks and Nature Reserves are the major component of the bioregional landscape (90.38%) and are also a large component of the bioregional landscape of the Sydney Basin (35.35%) and the NSW portion of the South East Corner (42.29%). The largest area, approximately 991,386 ha, falls in the NSW North Coast Bioregion. The remaining bioregions have less than 30% of their NSW area in National Parks and Nature Reserves, with the majority having less than 5% of their area within this system. The least reserved bioregions are the Riverina (0.32%) and Darling Riverine Plains (0.93%).

Currently the goals for National Parks and Nature Reserves in NSW are to incorporate the full range of landscapes within the bioregions and to ensure as much as possible that sufficient areas of these landscapes are conserved to allow them to function and persist for hundreds of years.

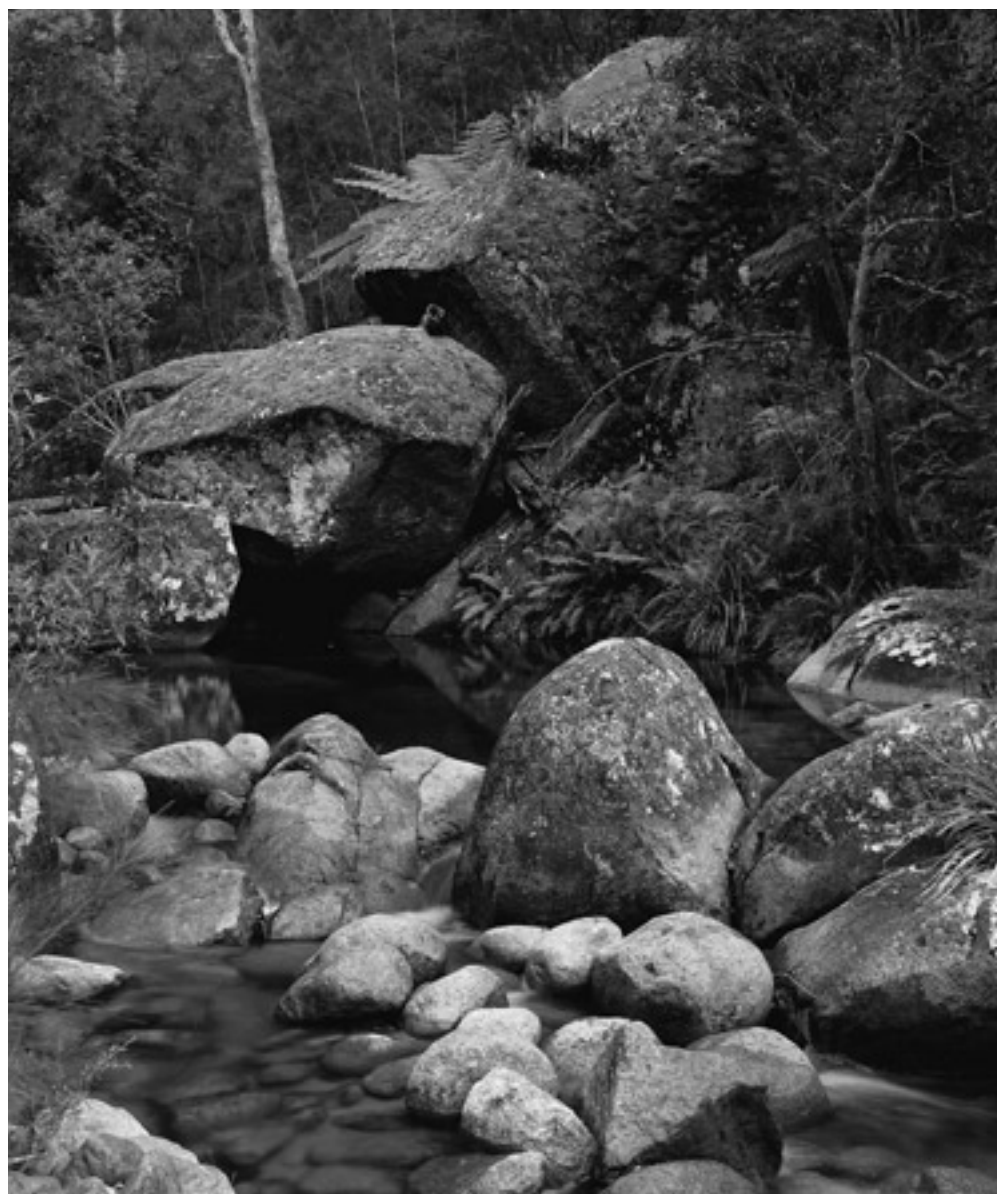


Photo: A. Brown

Even in the Australian Alps Bioregion, where the level of reservation is highest, the full range of landscapes is still not included in the conservation mechanisms surveyed.

### 8.2 The role of Wilderness Areas

Wilderness Areas are managed for the protection of an area's "wilderness" qualities. Declared Wilderness Areas provide a high level of protection for landscapes contained by them, but do not increase the total area of landscapes protected by conservation mechanisms. This is because wilderness, in all but one instance, has been declared over existing National Parks (the exception being a Wilderness Protection Agreement/Voluntary Conservation Agreement in the South Eastern Highlands Bioregion).

### 8.3 The role of Flora Reserves

Flora Reserves are managed primarily for flora conservation. In many cases these offer a similar level of security and protection to biodiversity as National Parks and Nature Reserves, although in some cases mining may be permitted

in them. Flora Reserves are present in 12 of the 17 NSW bioregions. The largest area of any of the bioregions occupied by Flora Reserves is in the NSW North Coast where 7,510 ha or 0.13% of the bioregion is contained by Flora Reserves.

#### 8.4 The role of Voluntary Conservation Agreements

Voluntary Conservation Agreements are represented in 10 of the 17 NSW bioregions. These are on private land, are voluntary, and are permanently on the title of the land, and despite their relatively small size (on a bioregional scale) in some bioregions, they contribute to protection of landscapes which are otherwise not included in conservation mechanisms. The largest area of any of the bioregions occupied by Voluntary Conservation Agreements, by area and by percentage of bioregion, is in the South East Highlands Bioregion, where 2,889 ha or 0.06% of the bioregion has been protected by landholders.

#### 8.5 The role of Property Agreements

Property Agreements occur in 12 of the NSW 17 bioregions. The largest area of any of the bioregions occupied by the conservation zone of Property Agreements is in the South Eastern Highlands Bioregion, where 6,354.29 ha or 0.13% of the bioregion has been contained by these agreements.

#### 8.6 The role of Wildlife Refuges

Apart from National Parks and Nature Reserves, Wildlife Refuges are the only conservation mechanisms to operate across all NSW bioregions. Wildlife Refuges occupy a larger proportion of the South Eastern Highlands Bioregion than either Voluntary Conservation Agreement or Property Agreement programs. A total of 68,776.84 ha or 1.41% of the South Eastern Highlands Bioregion is contained by Wildlife Refuges. The Wildlife Refuge program achieves the greatest proportion of bioregional conservation in the Simpson Strzelecki Bioregion, with 128,778.63 ha or 6.08% of its area, and the Channel Country Bioregion, with 74,518.13 ha or 5.21% of its area.

#### 8.7 The role of Regional Parks

The only bioregion containing Regional Parks is the Sydney Basin Bioregion where they occupy 4,675 ha or 0.13% of the bioregion. In this bioregion, Regional Parks expand on the conservation of landscapes that are also included in the system of National Parks and Nature Reserves, and contribute as much area as these to the protection of some landscapes that are under-represented in the bioregion.

#### 8.8 The role of Crown Reserves

Crown Reserves operate across 6 of the bioregions, all in the east of the State. In all cases, Crown Reserves expand the area of landscapes that are also included in the system of National Parks and Nature Reserves. Crown Reserves achieve the greatest proportion of bioregion conservation in the NSW North Coast Bioregion, where they occupy 21,862 ha or 0.38% of the bioregion.

#### 8.9 The role of Historic Sites

Historic Sites are present in almost half of the NSW bioregions. They are generally small areas set aside to conserve historic heritage. They generally contribute to the conservation of landscapes also represented in the system of National Parks and Nature Reserves.

#### 8.10 The role of Karst Conservation Reserves

Karst Conservation Reserves are found only in the NSW South Western Slopes and South Eastern Highlands Bioregions. They target very specific landscape

features and are small areas which slightly expand the areas of landscapes also conserved in the system of National Parks and Nature Reserves.

#### 8.11 The role of Aboriginal Areas

Aboriginal Areas occur in only 4 of the bioregions: Channel County, North Coast, Simpson-Strzelecki Dunefields and Sydney Basin. The largest area protected by this mechanism is in the Channel Country, with 9,387.15 ha or 0.66% of the bioregional area included.

### 9. Representativeness of conservation mechanisms

In general, conservation mechanisms tend to focus on the same landscapes. The additions to the range of landscapes represented in National Parks and Nature Reserves, in decreasing order, are as follows:

- in 15 of the bioregions, the Wildlife Refuge Program has increased the range of landscapes represented (while also overlapping with National Parks and Nature Reserves in other bioregions);
- in 10 of the bioregions, Property Agreements have increased the range of landscapes represented in National Parks and Nature Reserves;
- in 6 of the bioregions, Flora Reserves have increased the range of landscapes conserved;
- in 4 of the bioregions, Voluntary Conservation Agreements have increased the range of landscapes conserved.

There has always been overlap between the types of landscapes conserved by Crown Reserves, National Parks and Nature Reserves in each bioregion. Property Agreements and Wildlife Refuges also conserve similar landscapes in each bioregion.

### 10. Effectiveness of conservation mechanisms

In most cases, the landscapes have not reached even a conservative level (20% of their bioregional area) of representation in any of the conservation mechanisms let alone within the system of National Parks and Nature Reserves. To this extent, the overlaps in types of landscapes protected outside of the reserve system are potentially important complementary contributions to achieving long-term conservation of landscapes. Nevertheless, there is still considerable scope for further representation of landscapes already included in the conservation mechanisms surveyed. Wider targeting not only of the National Parks and Nature Reserves but other off-park conservation programs will help to achieve this.

There are still many landscapes in NSW that are not protected by any of the available conservation mechanisms. All bioregions contain some landscapes that are not protected. Only in the Australian Alps Bioregion is the full range of landscapes almost achieving some representation, but even in this bioregion, where a large percentage of its area is reserved, there are still some landscapes that are not protected.

State forests are described in the bioregional summaries of conservation status (Section 9 of each chapter) to provide a comparative picture of land management (Ecologically Sustainable Forest Management or ESFM). In addition, Flora Reserves are identified as the formal reserve component of the estate. Other conservation mechanisms that occur on the SFNSW estate (including informal reserves and protection by prescription) have not been individually identified at the landscape scale because of the complex interplay of conservation mechanisms and resource management.

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