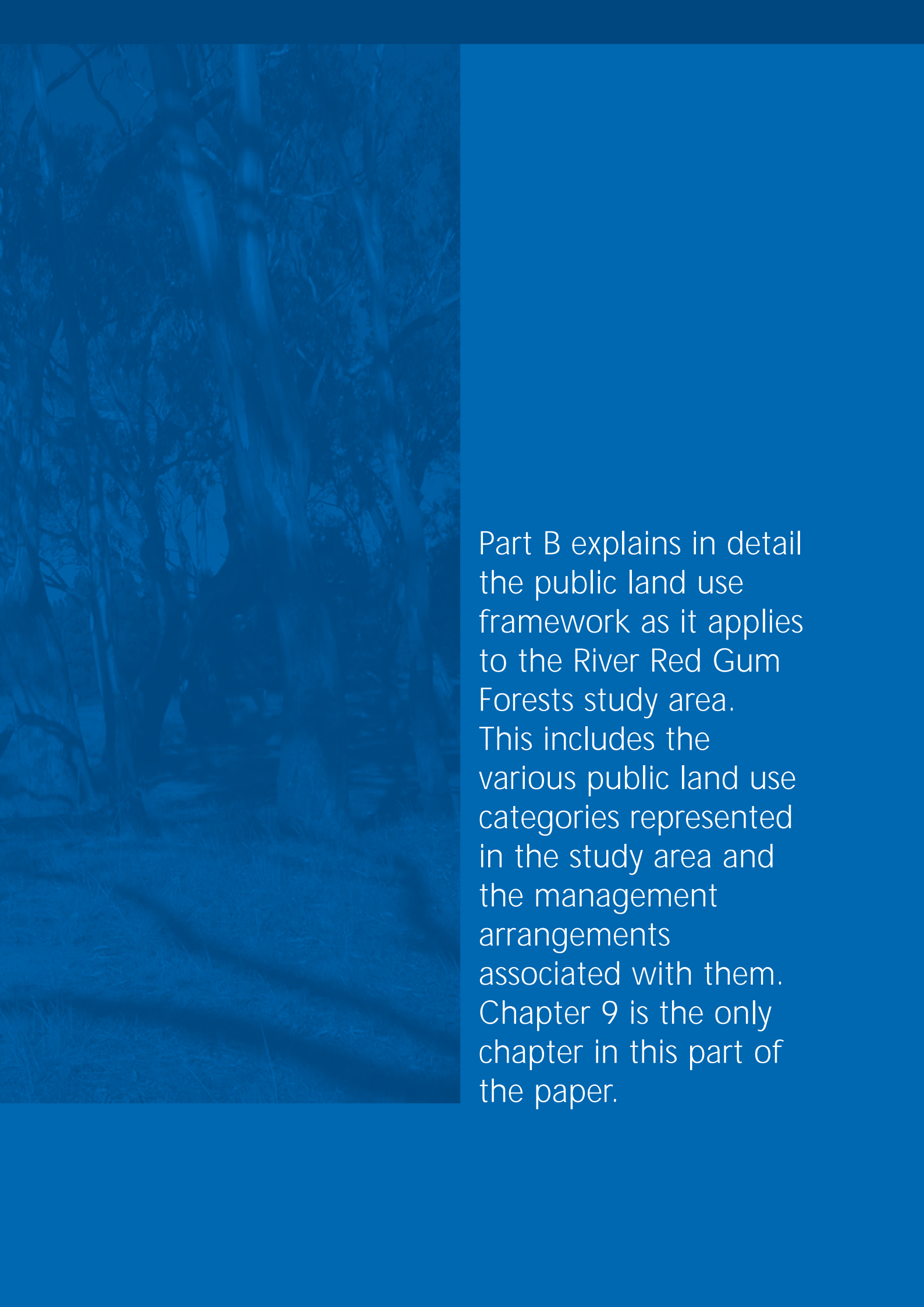


B

Public Land Use Framework



Part B explains in detail the public land use framework as it applies to the River Red Gum Forests study area. This includes the various public land use categories represented in the study area and the management arrangements associated with them. Chapter 9 is the only chapter in this part of the paper.

9 Public Land Use Categories and Management

This chapter provides an overview of the current public land use system in Victoria with a focus on those aspects most relevant to the study area. Victoria's public land use system is briefly compared with that in New South Wales and South Australia.

HISTORY OF PUBLIC LAND USE PLANNING

Three major stages have shaped the pattern of public land use in the study area as it is today: alienation of Crown lands (that is, transfer to freehold), protection of forest resources and strategic public land use planning. Each of these is considered in detail below.

Alienation of Crown Lands

Within a few years of explorer Mitchell's 1836 expedition through southwestern New South Wales and what was to become Victoria (see chapter 7), squatters began claiming large tracts of land for pastoral runs. Two decades later most of Victoria was occupied. Settlement patterns were strongly influenced by water supply, with the land closest to permanent water sources being settled first. The rich floodplains around Echuca were claimed early during settlement and most of the land between the Goulburn and Loddon Rivers was taken up by 1846. In 1846 Mildura was settled and, within 17 years, most of the Mallee was occupied by squatters. Several of the runs established in the Mallee during this time have remained public land with leases handed back after several years of drought and feral animal plagues which thwarted early agriculture (LCC 1987).

In 1851 a separate colonial government was established in Victoria and the annual Crown land pastoral leases were retained until a new land act was proclaimed in 1860 (LCC 1987). By that time, the imperative was to settle the land more densely and establish cultivated farmlands. Crown land was mostly alienated, or transferred to freehold, when surveyors (who acted as town planners) laid out and surveyed townships and farm allotments. Land was sold by way of selection, auction or ballot. A succession of Victorian Land Acts (1860, 1862 and 1865) heralded the end of the squatting era, with focus shifting toward more intensive agriculture. The *Land Act 1862* also changed the licensing system from annual to nine year licence periods. When licenses expired, the squatters were able to purchase portions of their runs and gain access to selections of land in recognition of their pre-emptive rights.

Agricultural settlement initially spread slowly along the Murray River, limited by the rate at which it could be surveyed. In 1869 selection before survey was

permitted and the remaining land was quickly occupied. By the 1880s most land in the mid-Murray had been leased for agriculture and was converted to freehold once the lease conditions had been fulfilled (LCC 1983). Land rights were through land improvement which encouraged the clearing of vegetation and intensive irrigated agriculture (LCC 1987).

Pastoral and then agricultural settlement inevitably involved the clearing of the land; indeed, selectors were required to 'clear' their land as part of the terms of transfer of title. Trees were typically ringbarked or burnt. As land clearance spread, the loss of timber resources became a concern exacerbated by the opening up of the forests for selection after the best agricultural land had been sold (or leased with a view to sale) by the 1880s. Moreover, the taking of timber from unalienated Crown lands (permitted under licence) was poorly controlled, placing even greater pressure on timber resources. The area of Crown land in the rich agricultural areas of the alluvial floodplains rapidly diminished. The only large areas of Crown land remaining in the Murray Valley region were water frontages and flood-prone areas of river red gum forests, and these were under increasing pressure as a timber source and for stock watering access. The value of these areas as public water sources was recognised by the creation of frontage reserves on all permanent streams in 1881.

In areas of high density settlement such as the Campaspe River catchment, little water frontage reserve remains with most of the adjoining land sold in the 1860s prior to the introduction of water frontage reserves. As a result, very little public land on the Campaspe has been retained except the beds and banks of the river which were declared public land under the *Water Act 1905*. Water frontages were often an area of conflict, with settlers fencing in frontages adjoining their land for exclusive use, resulting in major problems in drier years when little common ground for grazing was available (LCC 1983).

Pastoral occupation in the Mallee rapidly increased after the proclamation of the *Land Act 1869*, which aimed to increase the number of smaller blocks and reduce the size of pastoral areas. However, without secure tenure, occupation soon dropped by a third by the 1880s. Clearance of the land and settlement was slow due to the difficulty in removing Mallee vegetation, droughts and soil erosion.

The extent of public land in the Mallee today is shaped by climate limitations on the expansion of wheat cultivation from the Wimmera into the Mallee, the limits of which were largely reached by World War II. Further settlement was attempted through soldier settlement schemes providing low interest long-term loans for returned WWI and WWII servicemen. Soldier settlements occur within the study area in the Goulburn Valley centred on Numurkah, Katandra and Stanhope, and in the Robinvale, Yungera and Red Cliffs area. Both Crown land and freehold land was purchased and sub-divided under these schemes, however, much of

the Crown land made available was marginal. After periods of drought and the Great Depression, many leases were either consolidated into larger more profitable holdings or handed back to the Crown. In general, the current extent of public land in the Mallee today is much the same as what it was after WWII.

Protection of Forest Resources

The River Red Gum Forests study area supplied timber for the rapid expansion of European settlement in Victoria. Initial use was largely for fencing and building materials, but as the paddle-steamer trade route burgeoned along the River Murray, red gum and black box were cut without restriction from the river banks for fuel. The rapid expansion of agriculture on the irrigated floodplains and the discovery of gold in 1851 increased demand for infrastructure. River red gum was cut for harbours, locks and weirs along the river and to fuel irrigation pumping stations. Inland, trees were ringbarked to increase grazing area. The railway between Echuca and Melbourne was completed in the 1860s with sleepers harvested from river red gum forests along the Murray and major watercourses in northern Victoria.

Initially very few areas of public land were set aside for timber production and those large areas that have been retained are primarily on flood-prone land unsuitable for agriculture—such as Barmah forest and Gunbower Island—or areas less desirable for farming land due to climatic or soil condition. By the time settlement had expanded to the Mallee region in the northwest of the state, the need for controlled access to public resources such as timber was apparent, although extensive areas of cypress pine and belah were still cut for their durable and highly valued timber. Areas of river red gum and black box woodlands were retained west of Mildura (Walpolla, Lindsay, and Mulcra Islands) but these forests are of a more limited extent than those which formerly occupied the extensive floodplains in the central part of the study area. In places where squatters occupied and actively worked large land holdings, forests were cleared to the edge of the River Murray Reserve. Although agriculture, including dryland farming, increased with railway construction, several years of drought limited expansion and many areas of ‘improved’ farmland were returned to the Crown when unprofitable leases expired.

Local forest boards were established in the 1870s, but it was not until 1908 that an autonomous State Forests Department was established. This department controlled the production of timber from public land, reserved areas of forest, and collected royalties. In 1918 the Forest Commission was established and sought to repair the damage caused by a past lack of regulation that had resulted in immense wastage and over-cutting of preferred species significantly altering both forest structures and composition (LCC 1988). Drought and over grazing hampered attempts to re-establish forests in much of the western portion of the study area. The scarcity of multi-age and structurally diverse forests in the central and eastern part of the study area is a legacy of over use in the past (see chapter 14).

Balanced Public Land Use

For many years, the use and management of Victoria's public land and resources was driven by the demands of industry and ‘development’. In 1970 the government established the Land Conservation Council (LCC), charged with conducting a more strategic assessment and making recommendations for the most appropriate use of public lands (Clode 2006). At that time only 2.8 percent of Crown land was reserved for conservation purposes as national parks or wildlife reserves, or 1 percent of the total area of the state (LCC 1988).

The LCC divided Victoria into 15 study areas, undertook regional investigations of these study areas and recommended that public lands be allocated to a balance of specified land use categories. The LCC's recommendations were made after the collection of scientific information and an extensive process of community consultation.

Most of the River Red Gum Forests study area has been investigated in one or more of several LCC studies (see Table 9.1). Three of these studies have also been reviewed as part of the strategic approach adopted by the LCC to revise recommendations at approximately 10 year intervals to accommodate the changing needs for public land use. The largest area covered in previous investigations is that overlapping with the LCC's Murray Valley Investigation (1985) and the Mallee Review (1989).

In addition to the broad-based public land use investigations, three thematic special investigations also overlap with the study area. The statewide LCC (1991) Rivers and Streams Special Investigation focussed on major watercourses with special values. Areas bordering the Ovens and Goulburn Rivers were recommended as Victorian Heritage Rivers, and more general recommendations were made regarding stream and public water frontages. Only a limited area of the Historic Places South-west Special Investigation (1997) is included within the study area near Charlton but there are a number of historic sites identified throughout the study area (see chapter 12). LCC's Statewide Assessment of Public Land Use (1988) included mapping of Victorian land systems, described in the joint LCC and Department of Conservation and Environment report by Rowan (1990), the results of which are explored in chapter 3. The LCC's successor body, the Environment Conservation Council (ECC) completed the Box-Ironbark Forests and Woodlands Investigation (2001) across extensive areas of central and western Victoria. Although this study area overlaps with the River Red Gum Forests study area, public land within the area of overlap was not considered in detail during the ECC study.

LCC and ECC recommendations subsequently adopted by government have largely been implemented. Since the Mallee Review study (1989), there have been relatively few changes to the land use allocations, mostly arising from subsequent special investigations (see Table 9.1). The boundaries of LCC and ECC investigations of relevance to the River Red Gum Forests Investigation are shown in Map 9.1.

Table 9.1 Previous Land Conservation Council and Environment Conservation Council Investigations overlapping with the River Red Gum Forests study area.

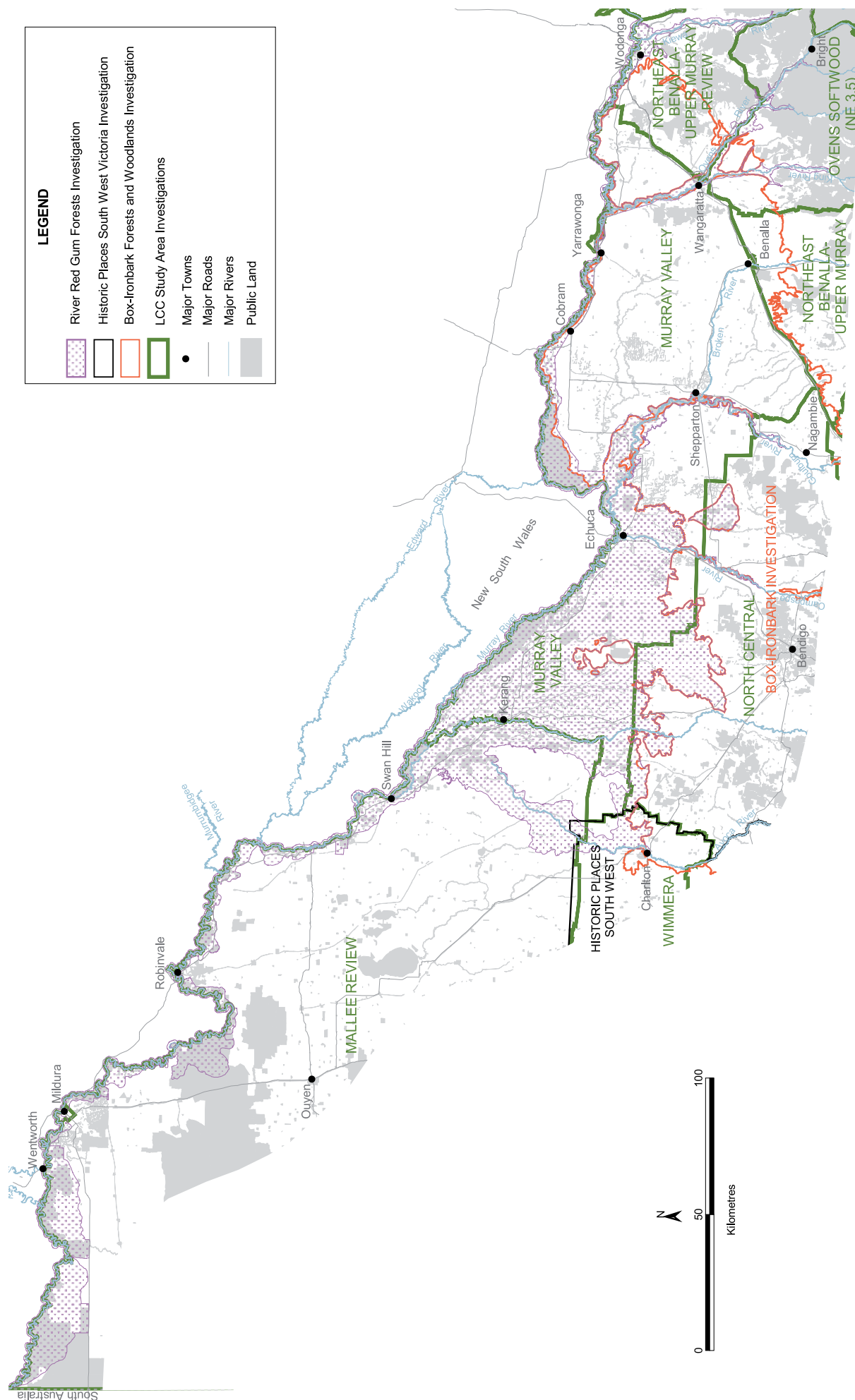
Investigation	Date	Key Implications For Study Area
Regional Investigations		
Mallee Area	May 1977	Led to the creation of the Wyperfeld and Hattah–Kulkyne National Parks, and Murray–Kulkyne Park.
Mallee Review	August 1989	Existing parks enlarged and several new parks and reserves established including Murray–Sunset National Park and Leaghur State Park.
Murray Valley Area	May 1985	Barmah and Terrick Terrick State Parks and several conservation reserves were established, as were several regional parks and the River Murray Reserve along the Murray River.
North Central Area	February 1981	Relatively little overlap with River Red Gum Forests study area.
North East District 1	November 1973	Small areas of public land in the first two investigations are included in the current study.
North East District 2	July 1974	
North East District 3, 4 & 5	April 1977	Expansion of Mount Buffalo National Park.
North East (Benalla–Upper Murray) Review—Districts 1, 2 & 4	January 1986	Creation of Wodonga Regional Park (land in the rural city of Wodonga was included).
Wimmera Area	November 1986	Minor area of overlap with the River Red Gum Forests study area principally along the Avoca River.
Box-Ironbark Forests and Woodlands	June 2001	Areas overlap with the River Red Gum Forests study area principally along the Murray River from near Yarrawonga to Echuca and in the lower reaches of the Goulburn River.
Special Investigations		
Ovens Softwood Plantation Zone (NE 3, 5 Review)	November 1981	North East Districts 3 & 5 were reviewed as part of Ovens Softwood Zone Special Investigation. LCC recommendations were not accepted by government.
Rivers and Streams	June 1991	A statewide study that, amongst other things, led to the designation of heritage rivers including the Ovens and Goulburn Rivers in the River Red Gum Forests study area.
Historic Places—South-Western Victoria	January 1997	Led to the creation of historic and cultural features reserves in southwest Victoria, although very few in the River Red Gum Forests study area.
Land Systems of Victoria	June 1990	Statewide mapping of land systems undertaken at 1:250 000 scale.

Present Needs and Expectations

Over time there has been a significant shift in the expectation and needs placed upon public land, particularly in relation to biodiversity protection. Land management agencies have increasingly sophisticated management plans to promote sustainability and protect

natural, economic and cultural values on public land. Private land owners also contribute to biodiversity protection through schemes such as ‘Land for Wildlife’. Similarly, timber plantations on private land reduce the pressure for timber resources on public land.

Map 9.1 LCC and ECC investigations overlapping with River Red Gum Forests study area.



Overview of Public Land Use Categories

Public lands are classified into the following major land use categories:

- parks—national, state and regional parks, wilderness parks, marine national parks
- nature conservation reserves—flora, flora and fauna, non-hunting wildlife reserves and marine sanctuaries
- historic and cultural feature reserves
- natural feature reserves—including bushland reserves, water frontages, streamside reserves and scenic reserves
- forest park
- state forest— including areas previously allocated specifically as hardwood production areas
- coastal reserves— coastal waters reserve and coast reserve
- community use areas—education areas, recreation reserves, parklands and gardens, schools, public halls and so forth
- water production areas—storage and distribution facilities
- plantations—softwood and hardwood plantations

- other categories—including alpine resorts, earth resources (stone reserves and coal production areas) and services and utility reserves.

Most land use categories define the primary purpose of the public land. For many of the land use categories a range of additional purposes is also defined. Each land use category is generally subject to particular legislation and management arrangements (see Table 9.2), although individual parks and reserves may also be subject to additional or alternative legislation and management arrangements.

Victoria's conservation reserve system mostly comprises national, state and wilderness parks and nature conservation reserves (see chapter 10). Other special features may be protected by specific reserves, such as historic and cultural feature reserves or natural feature reserves.

Special values of public land may be protected legally by overlays on the main land use category of an area. Such overlays include:

- reference areas
- wilderness zones
- remote and natural areas
- heritage rivers

Table 9.2 Summary of general land use categories, legislation and management arrangements.

LAND USE CATEGORY	LEGISLATION	MANAGER
national and state parks	<i>National Parks Act 1975</i>	Parks Victoria
regional parks	<i>National Parks Act 1975, Crown Land (Reserves) Act 1978 or Forests Act 1958</i>	Parks Victoria
nature conservation reserves	<i>Crown Land (Reserves) Act 1978</i>	Parks Victoria
historic and cultural features reserves	mostly <i>Crown Land (Reserves) Act 1978</i>	mostly Parks Victoria
natural features reserves	<i>Crown Land (Reserves) Act 1978</i>	Parks Victoria
forest park (Otways)	<i>Crown Land (Reserves) Act 1978</i>	DSE
state forest	<i>Forests Act 1958</i>	DSE
coastal reserves	<i>Crown Land (Reserves) Act 1978</i>	often committees of management (through DSE regions)
community use areas	<i>Crown Land (Reserves) Act 1978</i>	often committees of management (through DSE regions)
water production areas	various	water authorities
softwood production	<i>Victorian Plantations Corporation Act 1993</i>	private company as licensee
other reserves (e.g. services and utilities, stone reserves, coal production areas, etc.)	various	various (under DSE regions)

Note: Information in this table is a summary only. Any given park or reserve may be subject to additional or alternative legislation or management arrangement.



- representative rivers
- historic and cultural feature zones
- coastal protection and coastal recreation zones of coastal reserves
- scenic coast, and
- declared water supply catchments.

Special values of public land can also be specifically protected by zoning and prescriptions as defined in management plans, codes of practice and other management planning documents.

A public land use category is formally assigned to an area in a number of ways. Between 1970 and 1997 it was mostly undertaken through an Order in Council process, which directed government departments and public authorities to give effect to government-approved land use recommendations. The *Victorian Environmental Assessment Council Act 2001* retains the legal standing of such Orders in Council, which still define the approved public land use for an area unless it has been specifically amended or revoked by Governor in Council (s 28, *Victorian Environmental Assessment Council Act 2001*). Formal implementation of such Orders in Council can occur through amendment to legislation (for example, to the *National Parks Act 1975*), by changing the reservation of the land, or by administrative process. Current public land use categories in the River Red Gum Forests study area are described below.

In 1994 the LCC developed a revised and simplified system of public land use categories. Land uses from LCC studies before that date are shown on Map A as their equivalent in the revised public land categories. For example, areas approved by government as flora and fauna reserves are coloured as nature conservation reserves; approved bushland reserves and public land water frontages are shown as natural features reserves.

CURRENT PUBLIC LAND USE CATEGORIES

The extent of each major public land category in the study area is documented in Table 9.3. The study area boundary encompasses some 1,215,775 ha, of which approximately 262,915 ha is public land.

Table 9.3 The extent of major public land categories in the study area.

Category	Area (ha)
National Park	52,120
State Park	9920
Regional Park	7775
Nature Conservation Reserve	11,770
Natural Features Reserve (Murray River Reserve)	47,325 (16,060)
Water Production	10,800
Historic and Cultural Features Reserve	705
Community Use Area	3690
State Forest	106,710
Plantation	170
Earth Resources	125
Services and Utility	4760
Wildlife Co-operative Management Area	2520
Uncategorised Public Land	3845
Land not required for public purposes	680
Total Extent of public land included in the Investigation	262,915
Freehold	952,860
Total extent of study area (including all freehold and other land)	1,215,775
Overlays (areas included in the totals above)	
Reference Area (in various categories above)	3860
Heritage River (in various categories above)	16,450
Special Protection Zone (in state forest)	10,035

Note 1: The areas in this table are rounded-off to the nearest five hectares. The areas are mostly derived from spatial analysis of 1:25,000 or 1:100,000 mapping, and therefore may differ from other (generally less precise) area statements. For example, the area of Leaghur State Park according to Schedule 2 of the National Parks Act 1975 is '1583 ha more or less'. As a result, the areas in this table may not concur with those in other tables in this chapter which use the area statements from the official scheduling, proclamation, or reservation (whichever is appropriate) of lands in the various public land use categories.

Note 2: A number of larger blocks of public land are only partially included in the study area. This is particularly so for a number of larger national parks where only small sections of the parks are actually within the study area. e.g. Murray-Sunset, Hattah-Kulkyne and Terrick Terrick National Parks.

Parks

Until 1977 the only areas set aside for a park within the study area was the Hattah Lakes National Park. Initially about 16,800 ha in the Hattah area were set aside as a sanctuary for game in 1941 (Catrice 2002), but it was not until 1960 that the Hattah Lakes National Park (7200 ha) was declared after extensive lobbying from conservation groups throughout the 1950s. The LCC Mallee Study (1977b) recommended the enlargement of the pre-existing Hattah Lakes National Park (17,814 ha) and Hattah–Kulkyne National Park (46,160 ha) was created. The area of the Hattah–Kulkyne National Park was expanded to 46,500 ha in 1989 (LCC 1989a). At the same time the abutting Murray–Kulkyne Park was recommended to increase from 1600 ha with the addition of 1980 ha (LCC 1989a).

In the LCC Murray Valley Study (1985), no new national parks were recommended but Barmah State Park (7900 ha) and Terrick Terrick State Park (2500 ha) and several regional parks were recommended and later established. From the North-Eastern Area (Benalla–Upper Murray) Review (1986) several new regional parks were established. In the LCC Mallee Review (1989), a new national park, Murray–Sunset National Park (600,540 ha) was established covering large areas of mallee, river red gum and other vegetation types. Approximately 26,320 ha, of this parks falls within the study area, including the river red gum forests and associated vegetation communities on and adjoining Lindsay Island near the South Australian border. Under the same review, Leaghur State Park (1680 ha) was also created and the Murray–Kulkyne Park (1550 ha) enlarged. Prior to the ECC Box-Ironbark Investigation (2001), Terrick Terrick State Park (2493 ha) was established in 1988 and, with the addition of purchased private land (1277 ha), in 1999 Terrick Terrick National Park was established. The ECC Box-Ironbark Forests and Woodlands Investigation (2001) recommended Terrick Terrick Flora Reserve and some water frontages be added to the national park, resulting in an additional 110 ha to the park.

Details of the national, state and regional parks in the study area are provided in Table 9.4. Together, these parks protect a range of environments found in the study area and allow a variety of recreation activities in natural environments. While some parks include small relatively undisturbed areas, they nearly all include some areas with past disturbance, mostly by timber harvesting and grazing. The system of park and reserve classification in Victoria enables different classifications to meet differing land use needs, such as nature conservation, recreation, water supply, etc, to varying degrees. National and state parks primarily provide nature conservation, while regional parks have a focus on recreation. National and state park management plans generally apply a zoning scheme indicating the emphasis of management in specific parts of the park (see Table 9.5).

National Parks

National parks are generally substantial tracts of public land with outstanding natural features and diverse land types, primarily set aside to conserve and protect natural ecosystems. They also provide for public enjoyment,

education and inspiration in natural environments.

The three existing national parks in the study area, the Murray–Sunset National Park, Hattah–Kulkyne National Park and Terrick Terrick National Park, comprise about 19 percent of the public land of the study area.

DSE designates Murray–Sunset, Terrick Terrick and Hattah–Kulkyne National Parks as Category II (National Park) in the IUCN system of protected area management categories (see Box 10.1 in chapter 10). Protected areas in this category are managed primarily for ecosystem conservation and appropriate recreation.

Murray–Sunset National Park is the state's second largest national park (600,540 ha), and is one of the few remaining semi-arid regions that is relatively untouched. The park contains dunefields, groundwater discharge areas, grasslands, saltbush, river red gum and black box woodlands, a variety of rare and threatened flora and fauna, Aboriginal cultural heritage sites and historic sites relating to early pastoral activities and salt mining. There are also extensive opportunities for both passive and active recreation, with designated walking tracks, camping sites and four wheel drive tracks. The park covers several bioregions, 60 percent being in the Murray Mallee Bioregion, four percent in the Murray Scroll Belt Bioregion and the remaining 36 percent is in the Lowan Mallee Bioregion (see chapter 5 for Bioregion descriptions). Ten percent of the reserved public land within the Murray Mallee Bioregion and 88 percent in the Murray Scroll Belt Bioregion lie within the park. Although only about 4 percent (26,320 ha) of Murray–Sunset National Park is within the study area this subsection includes 25,770 ha (or 99 percent) of the protected Murray Scroll Belt bioregion compared to 546 ha (or only 0.14 percent) of the Murray Mallee Bioregion.

Hattah–Kulkyne National Park is typical of Mallee country with low scrub and open native pine woodlands. It also has riverine vegetation such as river red gum and black box woodlands, due to a network of freshwater lakes linked to the Murray River, known as the Hattah Lakes (see Figure 3.2). These lakes are largely included within the national park, and 48 percent (24,440 ha) of the park is within the study area. There are a variety of threatened flora and fauna species, Aboriginal cultural heritage sites, camping grounds, walking tracks and other facilities for recreational activities. The lakes are extensively used for water based recreational activities. Hattah–Kulkyne National Park is entirely within the Robinvale Plains bioregion. It is the only national park within this bioregion and comprises 64 percent of the reserved public land in this bioregion.

Lakes in Hattah–Kulkyne National Park are managed according to the Convention of Wetlands of International Importance, especially as waterfowl habitat, known as the Ramsar Convention (see chapter 5 Biodiversity). Australia is also a signatory to the Japanese Australian Migratory Bird Agreement (JAMBA) and Chinese Australian Migratory Bird Agreement (CAMBA), requiring land managers to protect habitat for listed birds, of which 11 species are found at Hattah–Kulkyne National Park. A strategic management plan has been prepared specifically to address conservation values of this wetland (DSE 2003e).

Terrick Terrick National Park near Mitiamo is the last remaining significant area containing the endangered northern plains grassland community—which is listed as a threatened community under the *Flora and Fauna Guarantee Act 1988*. The park also has the largest and most significant area of plains grassy woodland containing white cypress-pine, yellow box and grey box in Victoria. It contains threatened flora species such as annual buttons, pepper grass, slender darling-pea, red swainson-pea and threatened fauna species such as the plains-wanderer and hooded scaly-foot, a legless lizard species. It has imposing granite outcrops, a number of walking and vehicle tracks for a range of recreational pursuits and a significant number of Aboriginal archaeological sites. Past land uses such as timber harvesting, cropping, gravel and kaolin extraction remain evident in Terrick Terrick National Park.

Overall 27 percent (1055 ha) of Terrick Terrick National Park is within the River Red Gum Forests study area. Terrick Terrick National Park is the only national park to include the Victorian Riverina Bioregion (comprising 1212 ha or 31 percent of the park), the remainder being in the Northern Inland Slopes Bioregion. 87 percent of the protected area of Victorian Riverina Bioregion is in the study area. This national park also contains remnants of the listed northern plains grassland community, which has declined to a mere 0.5 percent of its original distribution.

Mount Buffalo National Park abuts the northeast section of the River Red Gum Forests study area where the boundary follows a land parcel or cadastral boundary. Areas of river red gum forests occurring along the public water frontage to the Ovens River are included in the study.

State Parks

State parks are generally not as extensive as national parks and their natural features are usually less outstanding, but they are important contributors to Victoria's park system and enjoy a similar level of protection as national parks. They are primarily set aside to conserve and protect natural ecosystems and provide for public enjoyment, education and inspiration in natural environments.

Barmah State Park along with the adjoining Barmah State Forest on the Murray River floodplain is the largest river red gum forest in Victoria (DSE 2003b). Together with the adjacent Millewa forest in NSW, it forms the largest river red gum forest in the world (DSE 2003b). Barmah State Park contains wetlands of international significance listed under the RAMSAR Convention (1971). These wetlands, both temporary and permanent, are used as part of the river regulation and flood mitigation system for the Murray River and provide habitat and breeding sites for numerous bird species, many of which are rare and threatened. Barmah State Park contains many significant fauna species, including a range of aquatic species. The park vegetation consists of areas of river red gum with box forests in the drier areas. A large number of Aboriginal archaeological sites as well as historic sites related to early use and settlement, in particular timber production and grazing, are located in the park. DSE places Barmah State Park in Category VI of the IUCN list of protected area

Figure 9.1 National Parks provide protection for conservation values and opportunities for nature-based recreation.



management categories. The area is widely used for a range of water-based and land-based recreational activities, including swimming, canoeing, fishing, four wheel driving and camping.

Leaghur State Park, on the Loddon River floodplain, contains some of the state's most significant black box wetland and woodland communities. Regular—even if infrequent—flooding is essential for the black box woodlands and frequent flooding creates ephemeral wetlands and promotes generation of variable age class stands. River red gum stands are also present and also require specific flooding regimes. The park provides habitat for many threatened fauna species and contains a number of largely undisturbed undulating soil formations caused by seasonal shrinking and swelling. There are a number of cultural sites, both Aboriginal and from more recent European occupation. Leaghur State Park is placed in Category II of the IUCN system of protected area management categories. Visitors to this park generally undertake passive recreation, such as walking and bird-watching, in a semi-remote, largely treed environment surrounded by a cleared agricultural landscape.

Regional Parks

Regional parks allow for more intensive recreational activity in fairly natural surroundings. They are commonly located near major regional centres and offer opportunities for activities such as picnicking and walking in a forest environment. Minor resource use is often permitted in regional parks.

The network of regional parks recommended by the LCC Murray Valley Review (1985) along the Murray River was designed to provide for a wide range of recreational activities.

Cobram Regional Park, which includes River Murray frontage, is predominantly river red gum open forest and

contains several billabongs and floodways. It is intensively used during summer, with many camp sites located along the river. There are also a number of sandy beaches which are extremely popular including Dead River, Big Toms, Little Toms, Thompsons, Scouts, Scotts and Horseshoe Lagoon. Major recreational activities include fishing, boating, swimming, walking, camping and picnicking.

Echuca Regional Park is located where the Goulburn River enters the Murray River, upstream of Echuca. It has a number of billabongs and floodways. Vegetation in this park consists of river red gum open forest, grey box open woodlands and some pockets of black box, and these woodlands provide habitat for the endangered squirrel glider. Recreational activities include camping, fishing, boating and walking.

Lower Ovens Regional Park is located at the confluence of the Ovens and Murray Rivers east of Yarrawonga. This park has a number of billabongs, river anabranches and islands created by water impounded behind the Yarrawonga weir. The vegetation is predominantly river red gum forest. The wetlands created by the weir provide valuable habitat for many water birds. It is a popular spot for fishing, boating, camping, swimming and bird-watching.

Murray-Kulkyne Park is located between the Murray River and Hattah-Kulkyne National Park. This park is listed under Schedule 3 of the *National Parks Act 1975* as 'Murray-Kulkyne Park' (hence the use of that name here), which is unusual for a regional park. Murray-Kulkyne Park is categorised as IUCN Category III (protected area managed mainly for conservation of specific natural features). This park has both floodplain vegetation and semi-arid vegetation communities which support several rare and threatened flora species. It also provides habitat for a number of key fauna species, including the near threatened tessellated gecko. Being adjacent to the Murray River, this park is used by many visitors and is popular for camping and access to water-based activities.

Tocumwal Regional Park consists of two discrete areas located along the Murray River west of Cobram. Only one of these two areas has frontage on the River Murray. The vegetation within this park is predominantly river red gum forest. There are a number of sandy beaches, including Apex, Mulberry, Pebbly, Finley, Carters and Labberts, which are popular and utilised for a range of recreational activities.

Wodonga Regional Park is located on a floodplain, near the confluence of the Murray and Kiewa Rivers. This park has continuous frontages to both rivers, and includes a network of billabongs, anabranches and seasonal wetlands. Vegetation consists of river red gum woodlands with a grassy understorey. The floodplains provide good habitat for many bird species. Attractive views of the surrounding landscape may be seen from the top of Huon Hill. Variable landscapes within the park provide for a wide variety of recreation opportunities, including four wheel driving, horse-riding, swimming, fishing and walking.

Much of the park is made up of land that was returned to Victoria after having been acquired by the Commonwealth-based former Albury-Wodonga Development Corporation (AWDC) in the 1970s. The park is currently managed by Parklands Albury Wodonga—a unique cross-border agency composed of government and community-based stakeholders with an interest in managing areas for recreational use in natural settings around Albury and Wodonga. Parklands Albury Wodonga manages some 4000 ha of parklands to this end—mostly as a Committee of Management. Other former AWDC lands have been returned to Victoria or are planned for disposal by the Corporation.

Yarrawonga Regional Park is located downstream of the Yarrawonga weir and is predominantly river red gum forest surrounding several billabongs and floodways. The Murray River frontage includes several sandy beaches, such as Green Bank, Chinamans Bend, Forges No.1 and No.2, Little Bruces and Zinettis No.1 and No.2. These beaches and Yarrawonga Common, as well as some open bushland within the park, are very popular for swimming, camping, and fishing.

One of the major issues considered by the LCC when recommending the original boundaries of these parks was the balance between nature conservation and timber production. As some areas had high capability for both nature conservation and timber production, this meant that some areas with park values were not included within the recommended parks system (and vice versa). Information on the flora and fauna distribution and values of the river red gum forests is now significantly greater than it was in the mid 1980s when most of the existing parks were defined. Usage of the parks has also increased significantly since their creation, particularly those areas along the major water courses including the River Murray.

Table 9.5 National and state park management plan zoning (figures for total area of each park).

National or State Park	Conservation (%)	Conservation and Recreation (%)	Recreation Development (%)	Reference (%)	Overlays (%)
Murray-Sunset	59.5	35.0	>1	4.5	Yes
Hattah-Kulkyne		95.4	>1	3.6	Yes
Terrick Terrick	24.6	72.8	0.1	2.6	
Barmah	88.0	8.4	0.1	3.6	
Leaghur		100	0.2		

Table 9.4 National, state and regional parks.

Name of Park	Area (ha)	Area (ha) in Study Area	Current Legal Status	Date of Creation	Primary Historic Land Uses	LCC Rec	Management Plan	Comments
Hattah-Kulkyne National Park	46,160	24,422	National Parks Act 1975 – Schedule 2	1960, additions in 1980 and 1989.		A2—1977 A5—1989	1996	Includes one reference area within the study area
Murray–Sunset National Park	600,540	26,341	National Parks Act 1975 – Schedule 2	1979, additions in 1991		A6	1996	Includes two reference areas within the study area
Terrick Terrick National Park	3770	1355	National Parks Act 1975 – Schedule 2	1988, additions in 1999 and 2002		A3	2003	
Barmah State Park	8362	8362	National Parks Act 1975 – Schedule 2B	1987	Extensive timber harvesting in the past and currently grazing	A2	1992	Includes two reference areas inside the study area
Leaghur State Park	1556	1556	National Parks Act 1975 – Schedule 2B	1992	Some timber harvesting in the past	A7	1998	Original area was donated to the Crown
Cobram Regional Park	511	511	Forests Act 1958	1986		A7	—	
Echuca Regional Park	563	563	Forests Act 1958	1986		A4	—	
Lower Ovens Regional Park	1328	1328	Crown Land (Reserves) Act 1978	1986		A9	—	
Murray–Kulkyne Park	3999	3999	National Parks Act 1975 – Schedule 3	1980 and additions in 1990		A5—1978; A10 and additional area A11—1989	1996	
Tocumwal Regional Park	483	483	Forests Act 1958	1986		A6	—	
Wodonga Regional Park	617	617	Crown Land (Reserves) Act 1978	Not Implemented		A21	—	
Yarrawonga Regional Park	311	311	Crown Land (Reserves) Act 1978	1986		A8	—	

Notes: The areas have been calculated from DSE spatial data and may vary from other published figures.

Nature Conservation Reserves

Together with national and state parks, nature conservation reserves comprise the state's core protected areas (see chapter 10). They encompass public lands of considerable value and are set aside to conserve species, communities and habitats of indigenous plants and animals of significance. The primary land use objective is nature conservation, although education, scientific study and passive recreation are permitted provided they do not damage the values of the particular reserve.

There are 38 nature conservation reserves in the study area (see Appendix 10), including fourteen wildlife reserves which have been designated as game refuges where hunting is not permitted—such areas are effectively nature conservation reserves and are managed as such. Where hunting is permitted in wildlife reserves, these are considered natural features reserves.

Many of the nature conservation reserves in the study area are small, eleven are under 50 ha, although five reserves are greater than 700 ha in size. Four of the reserves abut or are surrounded by state forest, six are adjacent to water frontage reserves and five abut or are surrounded by River Murray Reserve. One reserve is adjacent to the Goulburn River Heritage River. Unlike most national or state parks, the small size of nature conservation reserves means that they may be particularly prone to disturbance, both internally or from adjoining land.

Figure 9.2 Nature conservation reserves are an important part of Victoria's protected areas system.



Historic and Cultural Features Reserves

Historic and cultural features reserves are established primarily to protect places with highly significant historical remnants and features, such as buildings, structures, relics or other artefacts.

Throughout the study area there are a range of sites associated with Aboriginal history and European exploration, settlement, agriculture, timber production and gold exploration and mining. The historic and cultural features reserves within the study area are shown in Table 9.6. These reserves provide evidence of past land uses and their resultant effects on the landscape, and a means of interpreting current land uses. Other mechanisms, such as zoning, listing on heritage registers, and identification in planning schemes protect additional historic places on public land within the study area. Although in these cases the underlying land tenure or land use category does not specifically reflect the historic or cultural values, land managers see these sites as part of the overall public land values, and in some places a particular feature may be a key visitor attraction.

Natural Features Reserves

Natural features reserve is a general public land use grouping that includes several categories of land that have broadly similar land use objectives. They include:

- bushland reserves
- wildlife reserves (those that permit hunting)
- lake reserves
- scenic reserves
- geological and geomorphological features reserves
- streamside reserves
- water frontage reserves.

While the conservation values of such reserves are not generally as significant as the values of parks and nature conservation reserves, these areas nonetheless protect remnant vegetation, habitat, landscape character, natural and scenic features. They also provide opportunities for education and passive recreation. Details of natural feature reserves within the study area are provided in Appendix 11.

A majority of the bushland reserves in the study area are small isolated blocks of remnant vegetation remote from the Murray River. Thirty seven of the bushland reserves are smaller than 40 ha, while only five are greater than 100 ha. The Mystic Park Bushland Reserve (646 ha), located to the south of Swan Hill, was recommended by the LCC, but has yet to be formally reserved. This is the only bushland reserve in the study area larger than 200 ha.

There are thirty two wildlife reserves that permit hunting within the study area. Most of these are found on the floodplains of the Avoca and Loddon Rivers. Where hunting is not permitted in wildlife reserves, the public land use category is considered to be a nature conservation reserve, as described previously. Several wildlife reserves are also found along the Murray and Goulburn Rivers. Twelve of the wildlife reserves have an area less than 100 ha, but a majority are larger, with eight over 400 ha in size. Cullens Lake Wildlife Reserve (719 ha) and Lake Tutchewop Wildlife Reserve (509 ha)

Table 9.6 Historic and cultural features reserves.

Name of Reserve	Area (ha)	LCC Recommendations	Current Legal Status	Date of Creation	Manager	Comments
Bumbang Island Historic Area	566	V5—Mallee Review (1989)	Reserved for public purposes under <i>Crown Land (Reserves) Act 1978</i>	1990	Parks Victoria	Important site with evidence of Aboriginal occupation, over 600 scarred trees
Echuca & Waranga Trust Irrigation Pump & Channel Historic Area	5	E15—Box-Ironbark Investigation (2001)	Not implemented. Managed as if reserved.	2002	Parks Victoria	Oldest known irrigation pump housing in Victoria, of state significance
Happy Valley Creek Historic Area	1	No LCC Rec	Reserved for public purposes (historic purposes) under <i>Crown Land (Reserves) Act 1978</i>	1976	Parks Victoria	Also known as Myrtleford Jaycees Park
Kinipianial Creek Weir Historic Area	61	J24, then E1—North Central Study (1981) , then Box-Ironbark Investigation (2001)	Not implemented. Managed as if reserved.	1982	Parks Victoria	Weir built in 1885 by the Loddon United Water Trust. Some large river red gum woodland with large old hollow-bearing trees close to the Kinypanial Creek.
Major Mitchell Lagoon Historic Area	13	V4 Mallee Review (1989)	Not implemented. Managed as if reserved.	1990	Parks Victoria	Campsite of explorer Major Sir Thomas Mitchell. Relatively unchanged since then, with some important flora species present on the site.
Murchison Waterworks Trust Historic Area	1	J26 then E1—North Central Study (1981) , then Box-Ironbark Investigation (2001)	Not implemented. Managed as if reserved.	1982	Parks Victoria	Brick pumping cylinder and timber control gates erected by United Echuca and Waranga Waterworks Trust in 1882
Serpentine Creek Weir Historic Area	0.5	J28 then E1—North Central Study (1981), then Box-Ironbark Investigation (2001)	Not implemented. Managed as if reserved.	1982	Parks Victoria	Intact weir built by Loddon United Waterworks Trust to raise the level of Serpentine Creek
Woolshed Swamp Sheepwash Historic Reserve	13	I1—Murray Valley (1985)	Not implemented. Managed as if reserved.	1986	Parks Victoria	Adjacent to Woolshed Swamp NFR
Psyche Bend Pumps Historic Reserve	13	No LCC Rec	Reserved under the <i>Crown Land Reserves Act 1978</i>	1999	Parks Victoria	

are the two largest. Wildlife (hunting) reserves, or Victorian State Game reserves, permit hunting of game species during open season. The timing of the open season and setting of bag limits is determined by DSE based on environmental conditions. In 2006 the duck hunting season was from 18 March to 12 June. The bag limit was seven ducks per day, which includes a maximum of one Australasian shoveler, and all hunters must carry a valid Game Licence and Firearms Licence (see also chapter 11).

The majority of lake reserves in the study area are in the Kerang Lakes district and are typically surrounded by agricultural land. The exception is Lake Moodemere located adjacent to River Murray Reserve near Rutherglen in the northeast section of the study area. Streamside reserves generally include lands of nature conservation and recreation value along water frontages. The streamside reserves are mainly on the floodplains of the rivers that feed into the Murray River, and a majority are small, isolated blocks—only four are greater than 140 ha. There is approximately 17,690 ha of water frontage reserve in the study area. Additional values of water frontage reserves were identified during the LCC Rivers and Streams Special Investigation (1991).

Scenic reserves encompass areas of particular visitor interest such as waterfalls and lookouts. The only scenic reserve in the study area is below Kings Billabong, south of Mildura. It is surrounded by wildlife reserve and River Murray Reserve. The two highway parks within the River Red Gum Forests study area are isolated blocks located south of Echuca comprising about 33 ha in total. There are currently no geological and geomorphological features reserves in the study area.

River Murray Reserve

Public land in the immediate vicinity of the River Murray on both the Victorian and New South Wales sides has significant scenic, recreation, archaeological, historical, and conservation values. The river red gum forests, along with the many billabongs and floodways, provide feeding and breeding habitat for many species of native animals; they have particular significance in the conservation of species such as the regent parrot, which has specific nesting requirements. The state border along the River Murray is defined in Box 9.1.

The River Murray Reserve was established to conserve and protect many values and to maintain the riverine corridor. A comprehensive reservation of Crown land has been established along the entire length of the River Murray in Victoria, from Biggara near Corryong to the South Australian border. It includes the existing 60 m wide public purposes reserve, except where national parks, state parks, regional parks, and nature conservation reserves and wildlife reserves extend to the river. In some places additional areas of public land have been incorporated in the River Murray Reserve, which comprises more than 16,000 ha.

The Reserve follows the river as well as the major anabranches that are used as alternatives to the main river. In a number of sections, the reserve comprises only a relatively narrow strip (20–60 metres) of public land between private land and the River. Additional areas of Crown land have been included in the River

Murray Reserve to maintain the scenic tree-scape and the river environment. Next to the Gunbower forest, the River Murray Reserve forms a narrow strip between the River Track and the Murray (state border), with scenic values in the adjoining state forest also protected. The only other areas abutting the Murray River not reserved are small areas alienated prior to the original public purposes reservation in 1881 (e.g. within Swan Hill township).

LCC (1985; 1989a) recommended that management of the River Murray Reserve be directed towards enhancing and protecting the following values:

- scenic
- nature conservation
- historical and archaeological features
- opportunities for a diversity of informal recreation activities in an essentially natural riverine environment.

The reserve is also coordinated with management of other specific reserves along the River such as the Murray–Kulkyne Park, Barmah State Park, Wodonga Regional Park and the Lindsay Island portion of the Murray–Sunset National Park.

Limited resource use is permitted within the River Murray Reserve at the discretion of the land manager and where it is compatible with the values described above. Uses include apiculture, grazing, hunting, limited extraction of timber products from specified areas (but not within the 60-metre public purposes reserve), water management or extraction, and operations for the maintenance of bank stability for public safety, flood mitigation or erosion control. Some facilities, such as those associated with water management (pump sites or regulators) have had a negative impact on scenic values in the River Murray Reserve and land managers are working towards consolidating these sites to improve visual amenity.

Adjoining private land owner encroachments, occupations, infrastructure and other restrictions upon pedestrian access occur in some places along the River Murray Reserve. Given the significant length of the reserve boundary, management of these encroachments is difficult and requires systematic and prolonged consultation with local communities to rectify.

Land in New South Wales that abuts the River Murray has characteristics, values, and uses similar to those of the River Murray Reserve in Victoria. Within New South Wales, there is substantially less public land adjoining the River Murray. The LCC suggested that it would be desirable if land on both sides of the River could be managed in a consistent way (LCC 1985; 1989a) especially where public land exists on both sides.

Forest Park

Forest parks are provided for under the *Forests Act 1958* but this category under the Act has been supplanted by other categories.

In its Angahook–Otway Investigation, VEAC recommended legislation to create an Otway Forest Park. The government has provided for the Otway Forest Park to be established under the *Crown Land (Reserves) Act 1978*, although it has not yet been formally reserved. The category was created to provide opportunities for

informal recreation in natural surroundings, protect and conserve biodiversity and other natural values, whilst also allowing extraction of a limited range of natural resource products where compatible with recreation and natural values.

State Forest

State forests are usually large areas of forested land set aside to produce hardwood timber, conserve native plants and animals and protect water catchments. They also allow open-space recreation and education and protect sites of historic and Aboriginal cultural heritage significance. They may produce minerals, honey, gravel, sand, road-making materials, and other forest products. Like parks, the category of state forest is designed to achieve many objectives.

The land use category 'state forest' (as previously defined and used by the LCC) differs from the meaning of 'state forest' used in the *Forests Act 1958*. Under the *Forests Act 1958* the term 'state forest' describes reserved forest for the production of timber and other forest produce, and protected forest which brings the management of forest produce in proclaimed unoccupied Crown land, unused roads and water frontages under the jurisdiction of the *Forests Act 1958*. In this document, 'state forest' refers to the defined LCC land use category (LCC 1988).

State forest makes up well over half the public lands in the River Red Gum Forests study area. These areas include a range of vegetation types and natural features (such as floodplains, wetlands and islands) also many roads and facilities used by visitors. As well as

Figure 9.3 While primarily set aside to produce hardwood timber, state forests are also a source of other forest products and provide for a wide range of recreational activities and for nature conservation.



hardwood sawlogs and their residual timber products, these forests also produce firewood, sleepers, posts and poles (see chapter 14). Details of some of the major state forest areas are provided in Table 9.7.

Management of these state forest areas is according to government-accepted recommendations of the LCC, forest management plans and regional forest agreements. Each of these aspects is summarised in Table 9.8 and discussed below.

Table 9.7 Major State Forest areas.

Name	Area (ha)	LCC Rec	Current Legal	Manager
Barmah State Forest	21,260	F1 Murray Valley (1985)	Reserved forest under the <i>Forests Act 1958</i>	DSE—Forests
Belsar Island State Forest	2415	S2 Mallee Review (1989)	Reserved forest under the <i>Forests Act 1958</i>	DSE—Forests
Gadsen Bend State Forest	1515	S2 Mallee Review (1989)	Reserved forest under the <i>Forests Act 1958</i>	DSE—Forests
Gunbower State Forest	17,490	F1 Murray Valley (1985)	Reserved forest under the <i>Forests Act 1958</i>	DSE—Forests
Nyah State Forest	835	S2 Mallee Review (1989)	Reserved forest under the <i>Forests Act 1958</i> .	DSE—Forests
Cobrawonga State Forest	2500	F1 Murray Valley (1985)	Reserved forest under the <i>Forests Act 1958</i>	DSE—Forests
Mulcra Island State Forest	2600	S2 Mallee Review (1989)	Reserved forest under the <i>Forests Act 1958</i>	DSE—Forests
Wallpolla Island State Forest	9400	S2 Mallee Review (1989)	Reserved forest under the <i>Forests Act 1958</i>	DSE—Forests

Notes: These areas include softwood plantation lands that were never planted and have reverted to reserved forest.

Table 9.8 State forest land use categories and management zones.

Government accepted LCC recommendations (1985 & 1989)	Hardwood Production Area	Forest Area	Uncommitted Land
Land use category currently used for management purposes	State Forest		
Forest management area plan zoning (1992 & 2004)	Production Zone	Conservation Zone	
Forest management area plan sub-zones (1992 & 2004)	Hardwood Sawlog Production Domestic Water Supply A (sawlog harvesting) Domestic Water Supply B (no sawlog harvesting) Softwood Production Minor Forest Produce Green Firewood Production Zones	Rainforest Conservation Area Rainforest community and buffers Significant Floristic Area Wildlife Corridor and Native Fish Stream Reserve Geological Conservation Areas Water Supply Areas	
Regional Forest Agreement zones (2002)	General Management Zone	Special Management Zone	Special Protection Zone

Other Areas Managed as State Forest

Other areas currently managed as state forest within the study area arise from two different land use categories applied by the LCC in their regional investigations (LCC 1977a). These land use categories are:

- a) forest areas—land set aside as buffer areas to pine plantations; and
- b) uncommitted land—land without a primary land use managed to maintain future options.

During later LCC reviews, areas earlier classed as uncommitted were typically reallocated to other land use categories or placed in the then new category 'state forest' created to encompass hardwood production areas, 'forest areas' and much of the former uncommitted land. However, as the LCC's North-Eastern Victoria Ovens Softwood Plantation Zone Special Investigation (1981) recommendations were never accepted by government, such re-allocation did not occur for the uncommitted land in the study area. The study area includes 13 ha of such 'uncommitted' land currently managed as state forest.

Regional Forest Management Plans

Management plans are used for detailed planning and applying specific management priorities (within the multiple uses permitted) in different parts of the state forest. Within the study area, this planning was undertaken in the Forest Management Plans for the

Mid-Murray Forest Management Area (FMA) (DNRE 2002), the floodplain state forests of the Mildura FMA (DSE 2004f) and the North East FMA (DNRE 2001).

Management planning incorporated new information on flora distribution and values with EVC data collected for the largest forest management areas in 2002 (Mid-Murray) and 2004 (Mildura). Additional flora surveys were carried out in the North East Forest Management Area in 1987 and 1992 as well as an EVC mapping project in 1998. Two main zones were applied across the forest management areas—a production zone and a conservation zone. The majority of land was included in production zones, mostly for hardwood sawlogs. Areas were also identified as for producing green fuelwood and minor forest produce. The conservation zones encompass a range of identified special values such as significant flora, wildlife corridors, native fish streams and geological features. Recreation was considered to be generally appropriate in all zones, although subject to some restrictions in conservation zones.

Regional Forest Agreement

In August 1999, the North East Victoria Regional Forest Agreement was signed by the State of Victoria and the Commonwealth of Australia. The agreement established a framework for managing state forests in northeast Victoria including some limited areas in the study area. The Agreement identified special protection zones

(informal reserves) to complement the existing parks and nature conservation reserves (dedicated reserves) and established a reserve system consistent with the national comprehensive, adequate and representative conservation reserve system criteria for the region (see Map A and chapter 10 for details). Under the Agreement, the zones adopted supersede those of any earlier forest management plans.

Education Areas

Although most public land is available for passive (observational) education, education areas are specifically set aside as reserves where students can study the nature and functioning of natural ecosystems, observe and practice environmental analysis and field techniques and conduct simple long-term experiments. Education areas are usually selected to show areas that are undisturbed and disturbed (such as logging or agriculture). Appropriate facilities, including accommodation, may be established on-site or be located nearby. Environmental education is the long-term primary land use. The statewide network of education areas is intended to encompass examples of the state's major land systems and environments. The criteria used to select education areas are:

- Examples of major land types
- Maximum diversity of vegetation types, soils, geology
- Easy access

- Located to minimise the risk to users by wildfire
- Located close to other land types and land uses
- Large enough to prevent over use and include zoning to protect areas of special value
- Located to minimise erosion and pollution of the surrounding environment.

Three education areas have been designated within the study area, although only half of the Wemen Education Area is within the study area (Table 9.9). Each is accessible from a main road and together they encompass a range of the natural environments found within the River Red Gum Forests study area. The Wemen Education Area has been incorporated into Hattah–Kulkyne National Park. Wemen Education Area has only been used occasionally by school groups and there are no facilities available at the site. Spence Bridge Education Area, although not formally reserved, is managed as an education area, and has an established Scout camp—'Treetops'. This campsite is actively used by various groups and is booked most weekends. Visitors use both the education area and the surrounding forest for activities such as horse-riding and orienteering. Darling Junction Education Area has had minimal visitation, probably due to a lack of on-site facilities, however it is adjacent to Lock 10 on the River Murray where facilities are available. This education area abuts agricultural land providing a different range of environments compared with the other education areas in the study area.

Table 9.9 Education Areas.

Name of Education Area	Area (ha)	LCC Recommendation	Current Legal Status	Date of creation	Manager	Comments
Darling Junction Education Area	321	H5 Mallee Review (1989)	not formally reserved	1990	Parks Victoria	Adjacent to the River Murray, opposite the Darling River junction, contains quaternary alluvium of the present floodplain and adjacent higher terrace of the River Murray. Vegetation is river red gum forest, black box chenopod woodland, floodplain grassland and alluvial-rise shrubland. The billabong present is artificially high, due to being adjacent to Lock No 10, below the junction of the two rivers and the wetland has a diverse range of species. It abuts state forest.
Spence Bridge Education Area	228	M1 Murray Valley (1985)	not formally reserved	1986	Parks Victoria	Quaternary alluvium, floodplain with low sand dune. Vegetation is open river red gum forest (frequently flooded) and higher black box woodland, buloke woodland with associated grassland, lagoons and floodways. Surrounded by the Gunbower State Forest
Wemen Education Area (former)	426	H3 Mallee Review (1989)	Incorporated into Hattah–Kulkyne National Park under the <i>National Parks Act 1975</i>	1979	Parks Victoria	Murray River floodplain, lakes, red gum and black box woodland, sand dunes with slender cyprus pine woodland, mallee and hummock grass mallee. Close to agriculture, parks and irrigated areas.

Other Community Use Areas

Community use areas are primarily used for education, recreation or other specific community purposes. Many smaller blocks of public land have been set aside for particular community uses. The management of these reserves is often delegated to locally based committees of management. Some of these reserves contain small areas of remnant vegetation that contribute to local habitat and landscape values. Community use areas include:

- Recreation reserves—mostly small reserves close to townships with facilities for organised sports and informal recreation, e.g. sports ovals
- Parklands and gardens—small intensively used community parklands, playgrounds and ornamental gardens
- Buildings in public use—such as schools, public halls, court houses, police stations, etc.

Water Production Areas

Although water production includes harvesting, storing and distributing water (see chapter 15 Water Resource Use and Environmental Flows), the water production land use category only includes the actual water storage areas, diversion weirs, pump intakes and associated buffer areas. Separate land use provisions apply to the harvesting areas (see the section on declared water supply catchments below) and distribution facilities (which are usually within service and utility reserves).

There are also a large number of water reserves, storage tanks, bores, off-takes and water storages on public land which are reserved for water production. Pumps and weirs and some drainage basins on public land are included in water production areas. Drainage basins such as the Kanyapella flood protection area, are diversions for flood waters and therefore allocated to the services and utilities land use category. Some water storages in the Kerang lakes region are linked to other lakes reserved as wildlife reserves, e.g. Lake Tutchewop abuts Lake Tutchewop Wildlife Reserve.

A large number of water production areas were recognised by the LCC in the 1976 Mallee Study and subsequent Mallee Review (1989), Murray Valley (1985), North-Eastern Study 3,4 and 5, and the North-Eastern Area (Benalla-Upper Murray) Review (1986). In the Mallee, water is stored in elevated reservoirs before being pumped from earthen storages. Further upstream, water is pumped directly from the River Murray. In the Kerang region, water is drawn from Torrumbarry weir on the River Murray, and diverted to the Loddon River, where it then flows through a series of natural lakes connected by channels. These lakes include Reedy Lakes, Racecourse Lake, Lake Charm, Lake Tutchewop, Lake Kelly and Lake William.

The precise boundaries of the water production areas and, in particular, the buffer strips surrounding the defined facilities, are normally defined in detailed plans called special area plans (or pre-existing 'land use determinations') following the declaration of 'special water supply catchment areas' under the *Catchment and Land Protection Act 1994*.

From time to time, new facilities are required and old facilities decommissioned and areas allocated to water

production require amendment. There have been many changes in the administration of water resources since the 1980s, in particular the Water White Paper, *Our Water Our Future* (DSE 2004i). All former water authorities have been restructured and the total number significantly reduced. There are three rural water authorities in the study area, First Mildura Irrigation Trust, Lower Murray (Urban) and Rural Water and Goulburn–Murray Rural Water (trading as Goulburn Murray Water). Five water authorities maintain facilities for the storage and distribution of water (and management of sewage disposal) within the study area—Lower Murray Urban and Rural Water, Wimmera Mallee Water, Coliban Water, Goulburn Valley Water and North East Water (see chapter 15 for detailed discussion on water supply).

Plantations

Public land is used for both softwood (pine) and hardwood (eucalypt) plantations. Extensive plantations across the state occur on public and private land. School plantations have also been developed on small blocks of public land in some areas.

Softwood plantations have been established on both public land (mostly on land that was reserved forest under the *Forests Act 1958*) and private land. Plantations were established on areas of native forest as well as on reclaimed farmland, and may include remnant native forest forming small inliers, buffers, filter strips and landscape areas.

The LCC (1977a) North Eastern Investigation final recommendations covered existing and proposed plantations. By 1982, the state government made a policy decision to prohibit the further clearing of native forest on public land for softwood plantations. Some of the proposed plantation areas had been cleared and planted to pine, while other areas were never planted. The public land areas allocated for plantations by the LCC, but not planted for softwood production, remain reserved forest under the *Forests Act 1958*.

Most public land planted with pine was vested in the Victorian Plantations Corporation (under the provisions of the *Victorian Plantations Corporation Act 1993*), with perpetual licences over the timber resources granted to a private company in 1998. The two softwood plantations (Braithwaites and Junction) within the study area are both vested in the Victorian Plantations Corporation (VPC) and have subsequently been licensed to Hancock Victorian Plantations under the *Victorian Plantations Corporation Act (1993)*. These pine plantations are located in the Ovens Valley, on the high rainfall foothills of Mt Buffalo. Under Section 27G of that Act, the vested lands remain public land, although the Act provides for possible sale of the land. The current legal status of public lands vested in the VPC is unreserved Crown land.

Other Land Use Categories

Other land use categories include earth resources, service and utility reserves, and uncategorised public land. These cover land uses such as quarries, cemeteries, municipal buildings, lighthouses, aerodromes, water towers and service basins, and water and sewage treatment facilities. Such reserves are mostly small isolated blocks, although some lie within

larger areas of public land. Services and utilities occurring on broad-acre public lands are more generally under lease, licence or other authority.

Road Reserves

Road reserves are one type of service and utility reserve, the primary purpose of which is to provide for communication, transport and access. Vegetation along the road verges, however, can have particularly high conservation, recreation and landscape values, especially in agricultural districts where most of the native vegetation has been cleared. Geological features exposed in roadside cuttings are a resource for mapping the geology of an area and are often used for education. Management guidelines to protect roadside landscape, recreation and conservation values were developed by the LCC and adopted by government as were guidelines for unused road reserves.

Some small-scale soldier settlement schemes were established in the irrigation country on the northern plains. Some public land previously defined as 'land not required for public purposes' (often but not always associated with the soldier settlement areas) remains public land, although the majority has been sold for agricultural use. Freehold land which has been purchased by public authorities, is defined as public land for under the VEAC Act 2001 (reflecting previous circumstances under the LCC and ECC).

Uncategorised public land is a broad category including land for which no specific recommendation or land use has been ascribed. Some uncategorised public land may include areas not subject to previous LCC recommendations, notably freehold land owned by water authorities used for drainage protection works, salt disposal and new water storages. The remaining uncategorised public land comprises small parcels previously designated 'other reserves and public land' and areas in townships that were specifically excluded from previous investigations.

Township Land

The Land Conservation Council recommended that unreserved Crown land in some townships might be required 'for township purposes in the future'. In practice Township Land sometimes includes stream frontages, sports grounds, halls, schools, courthouses, police stations, depots and other utility areas, and grazed paddocks, discussed public facilities and vacant Crown land. Most of these areas were only mapped at the time at a scale of 1:250,000. With the current availability of high quality 1:25,000 scale topographic and Crown parcel mapping means that land subject to old Township Land category can be replaced by appropriate categories reflecting actual land uses. In addition, where DSE has initiated conservation of a reserve in a township as an area of natural interest it effectively becomes a natural features reserve.

Uncategorised Public Land

Uncategorised public land applies to other areas in townships where the public land has no primary public use. In the context of this Investigation VEAC will address these on a case by case basis.

Former Cities, Rural Cities, Towns and Boroughs

Under the *Land Conservation Act 1970* (under which the

LCC operated), all land within cities, rural cities, townships and boroughs was excluded from consideration by the LCC. This changed over time, as the *Land Conservation Act* definition was amended and municipalities changed status.

In the River Red Gum Forests study area, there are no formal LCC recommendations for the former Cities of Echuca, Mildura and Swan Hill, and parts of the former Cities of Shepparton and Wangaratta. For the former Borough of Kerang, there are only Rivers and Stream LCC recommendations. Crown land in these former cities, and around Kerang, is shown pale purple on Map A. A special Order in Council enabled LCC to make recommendations for public land in the former extent of the Rural City of Wodonga. These situations are not related to Township land category.

CURRENT PUBLIC LAND USE OVERLAYS

Three categories of land use overlay are defined by legislation: reference areas, heritage rivers and declared water supply catchments. A number of special values identified in public land use investigations of the LCC and ECC and recommended for specific protection have also been given legal standing—through Orders in Council requiring land managers to implement recommendations.

Reference Areas

Reference areas are relatively small areas of public land containing viable samples of one or more land types that are relatively undisturbed. Such areas are reserved in perpetuity as a scientific reference to compare modified and unmodified lands. Reference areas are proclaimed under the *Reference Areas Act 1978*. Each reference area management plan typically defines a surrounding buffer area in which restrictions are placed on land uses that may have a detrimental affect on the reference area.

No entry is permitted to these areas under ministerial management directives made under the Act (other than management personnel or those with ministerial approval). Approved research work may be permitted but grazing, mineral exploration, mining, harvesting of forest produce, quarrying, bee-keeping, educational use, recreational activities and all forms of harvesting (except for water harvesting) are all excluded activities. The management directive also requires compliance with approved Departmental management guidelines. Amongst other things, the guidelines provide for three-yearly assessments and define recommended buffer widths in which restrictions on activities apply outside the reference area. Depending on the activity, the buffer may extend from around 60 m (timber production) to 2 km (bee sites) or more. The *Mineral Resources Development Act 1990*, the *Extractive Industries Development Act 1995* and the *Petroleum Act 1998* provide additional statutory protection from exploration and extraction of earth resources.

Six reference areas occur within the study area, all of which have been proclaimed under the *Reference Areas Act 1978*. Three are within national parks—two located in the Murray–Sunset National Park, and one within

Table 9.10 Reference Areas.

Name	Area (ha)	LCC Recommendation	Date of Creation	Manager Land	Use of Surrounding Land
Toupnein Creek	1664	C11 Mallee Review (1989)	1996	Parks Victoria	Murray–Sunset National Park
Lake Wallawalla	998	C2 Mallee Study (1977)	1998	Parks Victoria	Murray–Sunset National Park
Tarpaulin Bend	440	C19 Mallee Review (1989)	1998	DSE, Parks and Forests	State Forest
Chalka Creek	329	C4 Mallee Study (1977)	1998	Parks Victoria	Hattah–Kulkyne National Park
Top Island	177	B2 Murray Valley (1985)	1990	Parks Victoria	Barmah State Park
Top End	124	B3 Murray Valley (1985)	1990	Parks Victoria	Barmah State Park

Hattah–Kulkyne National Park. Two reference areas occur in Barmah State Park (Table 9.10). The remaining reference area is Tarpaulin Bend located within state forest and River Murray Reserve, east of Murray–Kulkyne Park.

Toupnein Creek Reference Area is located on a floodplain and higher alluvial plain besides the Murray River. Its vegetation consists of black box–chenopod woodland, floodplain grassland and some areas of lignum, river red gum forest and alluvial plain shrubland. This area is unique in that it supports floodplain vegetation in a semi-arid environment.

Lake Wallawalla Reference Area is located in red–brown duplex soils of the higher alluvial plains, but includes a lunette and portion of the River Murray floodplain. Representative vegetation types include black box chenopod woodland, alluvial plain and alluvial rise shrubland.

Tarpaulin Bend Reference Area is located on the grey clays of the present floodplain of the River Murray. It is predominantly river red gum forest and black box chenopod woodland, and is a good representation of the mid-mallee vegetation communities of the River Murray floodplain. However, the course of the Murray River in this area has changed in recent years and the main channel now separates Tarpaulin Bend from the rest of Victoria (see also Box 9.1 and Figure 3.2). There is nearly permanent access by dry land from adjacent freehold land in NSW, making it very difficult for land managers to maintain the integrity of the reference area (in particular, to exclude grazing by domestic stock).

Chalka Creek Reference Area is flat floodplain with shallow channels consisting of the Coonambidgal Formation; mainly clay, sand and sandy clay. Vegetation is red gum and black box woodland maintained by flooding from the Murray River.

Top Island Reference Area is located on a quaternary alluvial land system and its floodplains are subject to frequent flooding by the Murray River. Vegetation

consists of an open river red gum forest with an understorey of Moira grass, warrego summer grass, swamp wallaby and common spike rush. Also present are tall closed grasslands of giant rush and grasslands dominated by Moira grass.

Top End Reference Area is also located on a floodplain on a Quaternary alluvial land system, subject to flooding by the River Murray. It is dominated by river red gum open forest with an understorey of terete culm-sedge, warrego summer grass and terete culm-sedge in association with a mosaic also including swamp wallaby grass, and grey box open forest.

Heritage Rivers

Victoria's Heritage Rivers were established to protect those rivers with outstanding values for current and future generations. The *Heritage Rivers Act 1992* followed government acceptance of the LCC (1991) Rivers and Streams Special Investigation recommendations. This systematic study focused on the biodiversity, recreational, cultural heritage and scenic values of Victorian rivers. The seventeen heritage rivers recommended were those rivers, or river reaches, that had at least four values of state or greater significance.

Several heritage rivers are to have no impoundment or other in-stream barriers constructed, retaining their free-flowing condition to protect native fish habitat, recreational canoeing or scenic values. Similarly, other recommended uses are related to the values being protected. The Goulburn and Ovens Rivers are the only designated heritage rivers in the study area (Table 9.11) and are listed on Schedule 1 of the *Heritage Rivers Act 1992*. Draft management plans for these rivers were released for comment in 1997.

The **Goulburn Heritage River** extends 430 km downstream of Lake Eildon to the Murray River near Echuca. This river supports significant river red gum communities, habitat for several threatened fauna species, high native fish diversity, Murray Cod habitat, high recreational fishing value, high scenic landscape

Table 9.11 Heritage Rivers.

Heritage River Name	Area (ha)	Area (ha) in Study Area	Length (km)	Date of Creation	Manager	Special Values to be Protected (LCC 1991) and Restricted Land and Water Uses (<i>Heritage Rivers Act 1992</i> – Schedule 3)
Ovens	3750	3750	57	1992	Parks Victoria, Forests	Scenic landscapes, threatened fauna and flora communities, fish habitat and diversity, recreational opportunities. No impoundments, artificial barriers or structures to be constructed, new water diversions not to significantly impair attributes.
Goulburn	19,310	16,657	430	1992	Parks Victoria, Forests	Catchment Management Authority Scenic landscapes, threatened fauna and flora communities, fish habitat and diversity, recreational opportunities. No impoundments, artificial barriers or structures to be constructed, new water diversions not to significantly impair attributes.

value and significant cultural heritage sites. The Goulburn River is a highly regulated river, with water stored at Lake Eildon and Goulburn weir and then diverted downstream for irrigation. A large proportion of the Goulburn River flows through a cleared landscape, with the public land water frontage generally less than 200 m wide, but below Toolamba, the river flows through the Lower Goulburn Riverine Forests which are up to 2 km wide. Below Murchison the river red gum open forests and woodlands are of state significance, as these communities are poorly represented in the reserve system. The understorey is a mosaic of rushes, grasses and sedges, although some areas have a shrubby or heathy understorey. The forest margins are often a mixture of red gum, yellow box and grey box, as this area is the boundary between the drier and the wetter red gum associations. The heritage river is important habitat for fauna species, including the squirrel glider, brush-tailed phascogale and barking owl. Below Shepparton the corridor is nationally significant as habitat for the squirrel glider, the southern myotis bat and the barking marsh frog. The Macquarie perch and Murray cod are both vulnerable species found also in the Heritage River (LCC 1991).

A 50-m wide Special Protection Zone (SPZ) has been established on both sides of the Goulburn River totalling 2050 ha. This corridor includes a 30-m public purposes reserve to protect the habitat of the endangered squirrel glider. Grazing practices and ecological burning strategies are also managed to protect the silver wattle understorey, which forms part of the squirrel glider habitat (DNRE 2002a). Grazing is permitted in the Goulburn Heritage River area and timber harvesting is permitted in a Special Management Zone (SMZ), with large old trees with hollows retained for habitat.

The **Ovens Heritage River** corridor extends from Killawarra to the River Murray confluence, including Lake Mulwala in the lower section. The alluvial floodplains along the Murray River and its tributaries are

predominantly river red gum open forests and woodlands. Large areas of these forests have been cleared along the Ovens River, but significant forests and woodlands, with intact understoreys of silver wattle and river bottlebrush, still occur on the floodplain between Spring Creek and Lake Mulwala. The Ovens Heritage River also provides habitat for threatened fauna such as the southern myotis bat, Murray cod and golden perch. The river corridor is also home to other important fauna species and has a high native fish diversity. The Ovens River is the only totally unregulated river in the study area and has high recreational fishing and scenic landscape values.

The Mid-Murray FMA Management Plan established a 30 m public purposes corridor either side of the Ovens River which is treated as an Special Protection Zone where no logging or removal of forest products is permitted. All the remaining state forest falling within the Ovens Heritage River corridor is Special Management Zone and managed to maintain mature trees for squirrel gliders and barking owls. Limited timber harvesting occurs and firewood harvesting has recently increased in this forest. With the exception of several areas set aside for the protection of squirrel glider habitat, grazing is permitted across the Ovens Heritage River corridor.

Declared Water Supply Catchments

Currently all declared water supply catchments (previously known as 'proclaimed water supply catchments'), including the Ovens River upstream from Wangaratta's offtake, are listed on schedule 5 of the *Catchment and Land Protection Act 1994*. Declared water supply catchments are legislatively defined as a type of 'special area'. Additional water supply catchment areas can be declared by Order of the Governor in Council. A declared water supply catchment does not, in itself, directly affect existing land use, but alerts planners, landowners, managers, and the wider community to the importance of the area for water supply.

Table 9.12 Declared Water Supply Catchments.

Catchment (sub-catchments)	Total area (ha)	Date of Creation	Special Area Plan	Water Production	Facility Relevant Water Authority
Lake Hume Northern Section	688,388	1984	Yes	Lake Hume Dam	Goulburn–Murray Water
Ovens River (Wangaratta)	297,656	1988	No	Pump offtake on Ovens River Gravity offtake on Buffalo Creek Gravity offtake on Mush Gully Creek Pump offtakes on King River	Goulburn–Murray Water (supplies Wangaratta, Myrtleford, Whitfield, Moyhu, Oxley)

Of the 106,550 ha declared water supply catchments in the study area, about 60 percent is public land. Further details of the declared water supply catchments are provided in Table 9.12. Water supply authorities generally do not have direct management responsibility for all land within catchments (except in parts of Melbourne's catchment)—only for the storage and distribution areas in water production areas. The catchment from which water is harvested has generally been allocated to other primary land uses, with water production specified as an additional land use. Nonetheless, catchment land managers, water authorities and catchment management authorities coordinate action to protect water quality and quantity in all domestic and, as appropriate, other water supply catchments.

Provision for detailed planning is made under the *Catchment and Land Protection Act 1994*, by way of 'special area plans' (or a pre-existing 'land use determination'). These plans are binding on public land managers and may recommend planning scheme amendments, which are binding on private landholders as well. An appropriate use in one catchment may not be appropriate in another due to differences in climate, geology, soils, topography, and vegetation, as well as the level of water treatment provided. In the end, appropriate use balances desired activities and treatment cost to ensure that harvested water meets accepted community standards.

Water yield and quality are key aspects of harvesting. Managing water yield and quality may involve many different approaches ranging from 'closed' catchments (e.g. most of those supplying Melbourne) to multi-use style catchments. In recent years some sources of town water have provided relatively poor water quality and supplies are now piped from higher quality sources.

PUBLIC LAND MANAGEMENT ACROSS CATEGORIES

Road Management

The road network in Victoria is managed by a number of authorities. Statewide there is approximately 196,000 km of roads (from major arterial roads to forest tracks). Roads can be divided into five main types, freeways (790 km), arterial urban (21,500 km), arterial non-urban (21,500 km), municipal (134,000 km—includes 40,000 km of roads in parks and forests) and Freeway tollways (22 km).

The *Road Management Act 2004* coordinates management for all public roads in Victoria. The Act allocates road ownership, management and accountability for policy, performance standards and liability. Responsibility has been allocated to VicRoads for freeways and arterial roads (not in built up areas), to local municipal councils for arterial roads in urban areas and local roads and to the relevant state agency, for example the Department of Sustainability and Environment for non-arterial State roads (i.e. forest roads).

The Act provides for several Codes of Practice outlining practical guidance for road authorities, works and infrastructure managers to perform their functions and duties. Codes have been developed through a process of stakeholder and public consultation, for the following areas:

- operational responsibility for public roads;
- clearways on declared arterial roads;
- road management plans;
- management of utility and road infrastructure in road reserves; and
- worksite safety—traffic management.

Management Objectives

Road reserves provide communication, transport and access. Roadsides are managed to maintain road functionality, and may involve vegetation removal or trimming, however, protection of conservation, visual, landscape and recreation values along roadsides is also important. This is particularly the case where roadsides provide habitat for threatened plants or animals, or is an important visual element in the landscape (i.e. adjoining major tourist routes or in largely cleared landscapes).

Road management agencies have developed management plans and detailed roadside vegetation mapping and survey in many places. Roadside management plans allow sites with significant biodiversity and cultural heritage values to be identified and guide roadside maintenance and treatments. They also prioritise a schedule of works and a framework for communicating with interested and affected parties and evaluating the achievement of strategic management objectives and statutory responsibilities.

Road management largely falls into either maintenance or development. Maintenance includes the continuing safe passage of vehicles along a roadway by maintaining

and ensuring:

- sight distance to junctions, signs and around curves;
- vegetation near the road is not posing a potential danger to life or property of road users e.g. trees that are structurally unsound or large trees close to the carriageway;
- adequate drainage including waterway clearance; and
- environmental assets within roadsides.

Development focuses on improving the efficiency of the existing road network through new roads, road widening and duplication. Flora and fauna and cultural heritage investigations are undertaken for most projects, except for sites where such values are unlikely to be present. Community consultation is part of many large-scale road management projects (e.g. Albury–Wodonga Bypass). During planning, a number of specialist studies are typically carried out to enable a full assessment of the potential impacts of the options under consideration and to develop appropriate management plans to minimise these impacts. This includes an Environment Effects Statement (EES) which then provides the basis for the preparation of a detailed Environmental Management Plan, which is required before construction commences.

Box 9.1 Victoria and New South Wales state border

The 1842 Act of the British Parliament defined the Port Phillip District—which was to become Victoria—of the colony of New South Wales as lying south of a line extending west from Cape Howe to the source of the nearest tributary of the Murray and thence downstream to the South Australian border.

The South Australia *Colonization Act 1834* passed by the British Parliament established the boundaries of the colony of South Australia with the eastern boundary being set at 141°E. When this boundary was surveyed between 1846 and 1850 the southern part of the line was set 2 minutes of longitude too far west. This caused a dispute with Victoria, when NSW and SA were drawing up the boundary north of the Murray, along the intended position of the meridian. The dispute continued until 1914 when the Privy Council ruled to maintain the status quo.

In 1851, Victoria ceded from NSW and the state border was defined as the top of the left bank (taken as high water mark) looking downstream. In 1855 it was decreed that Victoria's northern boundary should not run mid stream, but on the south bank of the Murray River.

In 1881 (May 27) (Government Gazette p1389) land along the River Murray and its tributaries were permanently reserved from sale. Crown land consisting of the bed and banks of a defined list of watercourses, together with adjoining lands (generally of a width of 20 metres on both sides of the watercourse) that had not been previously alienated, were permanently reserved for public purposes.

This permanent reservation notionally falls between the official state border (top of the left bank) and the winter river level. The land that forms the popular beaches when water levels are lower than the top of

the southern bank is officially in NSW, but is managed informally by Parks Victoria as it is largely accessed via the Murray River Reserve along the Victorian bank of the River. In those parts of the study area alienated prior to 1881 there are few water frontage reserves. However, under provision of the Water Act 1905, the beds and banks of all watercourses (that form the boundary of freehold allotments) were deemed to be Crown land.

The changing course of the River Murray has gradually changed both the border and the Crown land reserves along it. When the river changes its course completely, however, and meanders are cut-off or bypassed, the state border remains along the original channel.

In 1982 the High Court settled a dispute of the border concerning the location of the border in relation to Beveridge Island, which was first arose in 1873. It was found that more water flowed through the northern channel of the island than the southern, so this was decreed as the state border. Guidelines were also established in relation to the border, and that only slow and imperceptible change in the river will alter the border. Flood events, which alter the course of the river, do not change the state border location, which will remain at the southern bank of the old river channel, even if water no longer flows along that course (LCC 1987).

In some places the waterfront reserves have disappeared due to the gradual change in course of the river, and now the river potentially adjoins either other public land or freehold land. Changes to the permanent reservations, require surveying and amending legislation.

Road Improvement and New Roads

Specific road improvements projects within the study area include the Hume Freeway Albury–Wodonga Bypass (under construction), Murray River crossing bridge works at Corowa, Cobram and Robinvale, and Goulburn Valley Highway works at Arcadia with bypasses in development at Shepparton, Strathmerton and Nagambie.

The 17.4 km four lane Hume Freeway upgrade project through Albury–Wodonga is a largely federally-funded project with a total cost in excess of \$500 million. The project includes a second Murray River crossing, to provide an additional link between Albury and Wodonga, and twenty-six new bridges. The project is expected to be completed by mid 2007. The upgrade is designed to reduce congestion and travel times between Albury and Wodonga (35,000 vehicles per day will be removed from the Lincoln Causeway), eliminate six railway level crossings on roads adjacent to the new highway, bypass 17 sets of traffic lights and 5 right-angled bends (such as ‘rollover corner’) on the Hume Freeway.

Replacement of the existing truss bridge crossing the Murray River between Cobram and Barooga is to be completed in 2006. This \$12 million project is jointly funded by the New South Wales and Victorian Governments, and will provide for the rehabilitation of the existing structure for future use as a combined cycle and pedestrian path after the completion of the new bridge.

The Goulburn Valley Highway is a vital transport link connecting the fruit growing and food processing industries around Shepparton, with markets in Melbourne and Brisbane. The Goulburn Valley Highway is fully funded under the Australian Government's Auslink Transport Plan. The strategy for the development of the Goulburn Valley Highway is to:

- provide a divided highway between the Hume Freeway and Victorian/NSW Border at Tocumwal;
- provide bypasses of Nagambie, Shepparton and Strathmerton; and
- duplicate the highway at Arcadia.

Dual carriageway and duplication has been completed for two section of the Goulburn Valley Highway. The duplication from the junction with the Hume Freeway, near Seymour, to south of Nagambie was opened in March 2001 at a cost of \$49 million. The Murchison East Deviation, involving 18 km of dual carriageways from Wahring to Moorilim, was opened in February 2003 at a cost of \$88 million.

Planning studies are progressing on the Nagambie, Strathmerton and Shepparton bypasses. The planning study to determine the alignment for the future Goulburn Valley Highway bypass of Shepparton commenced in 1995. The Shepparton study developed options for constructing a dual carriageway of approximately 36 km in length, with a deviation to the west of the township the preferred alignment. Construction of the Shepparton, Strathmerton and Nagambie bypasses is yet to be agreed upon under the federal Auslink Transport Plan.

Funding for the \$40.5 million Arcadia section duplication

project linking the northern limit of the Murchison East Deviation and the southern limit of the proposed Shepparton Bypass to the preferred western alignment, was announced in February 2006.

A future project for consideration is the re-alignment of traffic movements west of Strathmerton and Tocumwal along the Goulburn Valley Highway. This project has the potential to save 9 km of travel compared with the current route and enhance road safety by eliminating a number of curves and narrow bridges near the border with NSW and the Murray River.

Another area of road improvement is the state government's ‘Run Off the Road Program’. VicRoads is mid-way through implementing this \$80 million program as part of the government's Safer Road Infrastructure Program. Despite there importance as vegetation, large roadside trees pose a serious potential hazard in many areas. VicRoads have assessed the value of the vegetation and consultation with DSE and local municipal councils. Environmentally significant trees are cordoned off with wire rope barrier or guard rails, where feasible. Rigid barriers such as guard rails requires minimal vegetation removal, whereas wire-rope barrier may require some clearance of vegetation behind the barrier of about 1–2 metres to allow for the flexible nature of the barrier. However, wire-rope barriers reduce crashes by 90 percent, whereas rigid barriers only reduce crashes by 45 percent.

The state government announced \$4.7 million per annum on-going, in the 2005–06 budget, towards the maintenance of roads in state forest.

Railways

Historically, railways have played a critical role in the expansion of the state's economy. In particular agriculture has benefited infrastructure for transporting goods to markets and the wider community. Rail networks decreased the reliance on paddle-steamers, and the River Murray as a trade route and created opportunities for the expansion of the Port of Melbourne. Today, rail routes still transport both goods and people throughout Victoria, but as road transport increased, some railways were closed and decommissioned. Many of these decommissioned lines have been transferred to ‘rail trails’ for recreational use or bushland reserves with outstanding natural values. For example, the Bonegilla Station Bushland Reserve, east of Wodonga was reserved partly to protect the threatened purple diuris orchid species. In other places, rail reserves have been sold to adjoining land owners. This alienation of public land was initially conducted in an ad hoc manner, but in the late 1980s a systematic review of rail reserves was undertaken. Where outstanding natural or recreational values were identified, the land was set aside to protect these values.

Victorian rail reserves are the repositories of some of Victoria's most threatened species and communities, largely due to their management history. Regular burning for fuel reduction was an essential part of management of rail reserves for over a century. This management regime resembled, at least in part, the pre-European ecology. Rail reserves that have not been grazed, ploughed, graded or sprayed with herbicides

contain some of the most endangered communities and plant species in Australia. Examples are the nationally endangered turnip copperburr, and mountain swainson-pea, and critically endangered spiny rice-flower. Some of the best examples of Northern Plains Grassland community, listed under the Victorian *Flora and Fauna Guarantee Act 1988*, occur on rail reserves within the River Red Gum Forests study area.

Appropriate management of these sites is essential for the conservation and protection of threatened species and communities in Victoria. The Victorian Rail Industry Environment Forum (consisting of DSE, DPI, Country Fire Authority, VicTrack, Pacific National, Australian Rail Track Corporation, Connex, and Municipal Association of Victoria) is currently developing Vegetation Management Guidelines for Rail Corridors (due to be released in 2006). These guidelines will provide a framework for land managers and rail lessees to encourage changes to works practice addressing biodiversity conservation, prevention and reduction of weeds, fire management and efficient rail operations.

Fire Management

Victoria is a fire-prone landscape and has been for many thousands of years. Archaeological and historical evidence indicates that Aboriginal people used fire to manipulate the growth of forests and grasslands and to encourage animals dependent upon these environments (see chapter 4). Fire management requires both an understanding of the role fire plays in biodiversity maintenance and the threat to life and property.

Fire Management on Public Land

Approximately one third of Victoria is public land consisting of mostly parks and state forests. The Department of Sustainability and Environment (DSE) is responsible for fire management and suppression on all Victorian public land. DSE (and Parks Victoria as the service agency managing conservation reserves and parks) must be prepared for both bushfire and the planned use of fire for asset protection and ecological purposes. Within DSE the Fire Management branch has responsibility for providing authoritative advice on wildfire prevention and suppression, planned fire, fire monitoring on public land, response coordination, specialist fire equipment, training and research.

The Code of Practice for Fire Management on Public Land (DCNR 1995) provides a framework for efficient, effective, and integrated management of fire and fire-related activities on all public land in Victoria by DSE. Key objectives are to protect human life, property, assets and environmental values. The Code establishes a framework for wildfire prevention and suppression activities on public land. Under the Code, these activities are to be conducted in an effective, operationally safe, environmentally sensitive and cost-effective manner. The existing Code is currently being reviewed by DSE in line with the 10 year cycle enabling public comment and consultation and incorporation of the most up to date fire management science. The adoption of a new Code is expected in 2006 (DSE in prep).

A strategic or regional Fire Protection Plan is also prepared for each fire district (Map 9.2). These plans

specifically aim to ensure that wildfire prevention and suppression occurs on public land within each fire district, whilst also protecting environmental values of public land. Extensive consultation is undertaken with managers of public land and fire authorities as well as the community prior to completion of each plan.

In addition, each year DSE prepares a Fire Operations Plan for every fire district across Victoria. These plans are prepared in consultation with the community and education programs for fire preparedness and fire prevention. Each plan provides a schedule of proposed wildfire prevention and suppression activities for public land including prescribed burns and road and track maintenance for a three year planning period, but is reviewed annually. These plans have four main strategies for wildfire: prevention, preparedness, suppression and recovery. The fire protection strategies and practices are designed to meet both fire protection and environmental objectives.

The River Red Gum Forests study area encompasses parts of five fire districts: Mildura, Bendigo, Shepparton, Ovens, and Upper Murray.

Wildfire Occurrence on Public Land and Causes

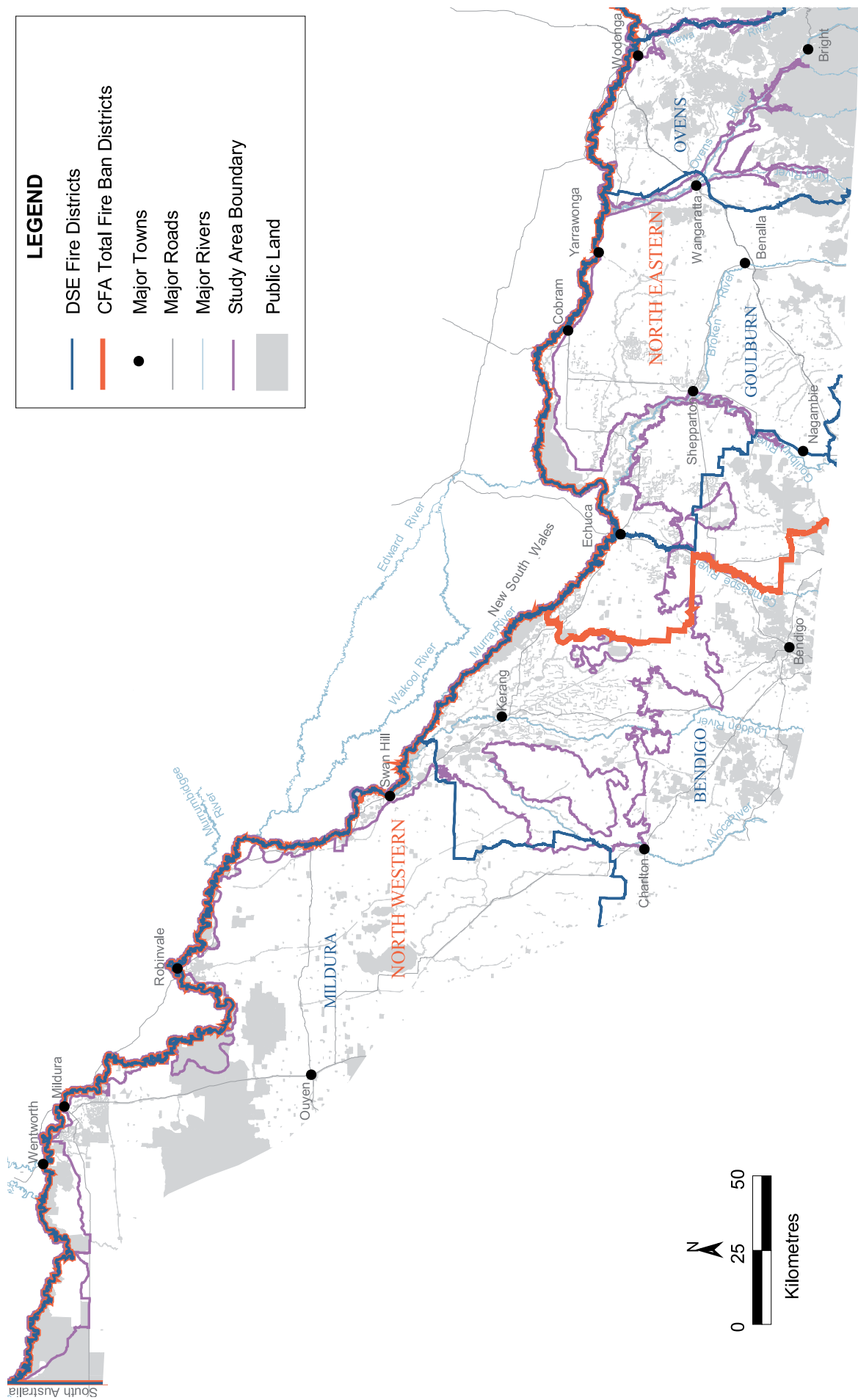
DSE estimates that on average 620 fires occur within Victorian public land each year (Wareing & Flinn 2003). These fires are caused either naturally or by human activities. Virtually all wildfires of natural origin are caused by lightning strikes. These fires often occur when thunderstorms roll across Victoria and can light large numbers of fires rapidly. For example, on 8 January 2003 over 80 fires were ignited by lightning in eastern Victoria (Wareing & Flinn 2003). Approximately 26 percent of all bushfires on public land are started by lightning strikes.

All other bushfires on public land are a direct result of human activity including both deliberate and accidental ignitions. On average, campfires left unattended or not properly extinguished cause 10 percent of these fires. Within NSW, solid fuel fires are banned in state forests of the Riverina region throughout summer because of the increased risk of campfires escaping and starting fires (NSW Department of Primary Industries 2005a).

Agricultural burns on private land are lit by farmers to control weeds, burn crop debris and removal of rubbish. The fires, particularly unattended burns, can 'escape' and become wildfires spreading on to public land. These fires cause over 15 percent of wildfires on average each year and burn approximately 8000 ha of public land each year. By comparison, prescribed burn escapes constitute approximately 2 percent of bushfires on public land. Equipment or machinery that generates heat or sparks such as chainsaws, slashers, welders, grinders, and exhaust from vehicles, ignite about 3 percent of public land fires and burn approximately 2500 ha of public land.

Malicious or deliberate fires include children playing with matches or experimenting with fire, farmers deliberately lighting fires without necessary permits or authority, or fires lit with intent to damage or destroy property as an act of vandalism. Deliberate lighting is the second highest cause of all bushfires on public land (25 percent) after lightning (26 percent). In an average year, people

Map 9.2 Fire Districts for public land fire management purposes.



cause up to two thirds of wildfires on public land, either deliberately or accidentally.

Controlling Wildfires on Public Land

A public inquiry conducted by the Emergency Services Commissioner was established following the 2003 Alpine fires which burnt some 1.1 million hectares in Victoria over a period of nearly 60 days (Esplin 2003). This was the fifth major inquiry resulting from large or significant bushfire events in Victoria and is typical of high community concern following major bushfires events.

Both the Victorian Bushfire Inquiry (VBI) (Esplin 2003) and a Commonwealth select committee investigation (House of Representatives Select Committee into the Recent Australian Bushfires 2003) received public submissions on the fire season 2002–03. Criticisms voiced by the community regarding fire management during these inquiries and issues regarding management of fire on public land is discussed in chapter 19.

Use of Traditional Aboriginal Burning Strategies

Traditional burning strategies or regimes are sometimes raised as a method of fuel and hazard reduction on public land. However details of these practices and how they should be applied to a fragmented landscape with changed climatic conditions are harder to obtain. The arrival of Europeans has dramatically changed Australian environment and the lives of Aboriginal people. Although some knowledge remains of traditional burning strategies, most has been lost, or is fragmentary. With only a partial understanding, and applied only to public land, this re-creation would not be comparable to traditional practices. Following detailed investigations, Esplin (2003) concluded:

“While it would be advantageous to have Aboriginal knowledge added to the decision-making process – as is now done for Kakadu and Uluru-Kata Tjuta National Parks in the Northern Territory (Langton 2000) – any use of a ‘traditional Aboriginal burning regime’ within a park or State Forest in southern Australia would be an experiment in land management, rather than a re-creation of Aboriginal fire regimes, and should be recognised as such”
Esplin (2003).

PUBLIC LAND USE CATEGORIES IN NEW SOUTH WALES AND SOUTH AUSTRALIA

Public land adjoining the study area in New South Wales (NSW) and South Australia is shown on Map A to provide context, particularly in terms of conservation and resource management. A brief description of conservation reserves and state forests in these states is provided below.

New South Wales

Conservation Reserve Categories

In NSW, there are 751 parks and reserves which cover 8.1 percent (6.5 million ha) of the state. The different categories of conservation reserves in NSW are outlined below.

- National parks are similar to Victoria in that they are large areas protected for their landscapes, and flora and fauna values. They are widely used and often have visitor facilities.
- Nature reserves are areas of special scientific interest, predominantly established to conserve native plant and animal communities.
- State conservation areas are parks with some important landscape features, set aside mainly used for recreational activities.
- Regional parks are located near large population centres and are used mainly for recreational and cultural activities; they are often located in altered landscapes.
- Marine parks are areas with unique and outstanding marine flora and fauna, zoned for recreational or commercial activities.
- Aboriginal areas are places culturally significant to Aboriginal people and are managed in accordance with the area's cultural values.
- Historic sites are sites of national cultural importance, including buildings, monuments and landscapes.
- Wilderness areas are usually an ‘overlay’ on national parks and reserves. They are large areas, remote and essentially unchanged by human activity, managed so that native flora and fauna communities are disturbed as little as possible (NSW NPWS).

Of these protected areas in NSW, 143 are national parks, which comprise 4,172,308 ha (5.2 percent of the state area). The second largest category of parks and reserves are nature reserves 724,650 ha (0.9 percent). The remaining reserves make up the remaining 0.1 percent of the state's protected areas.

On the NSW side of the River Murray, the only park or reserve adjoining the river, is Kemendok Nature Reserve (1043 ha) near Colignan. It consists mainly of river red gum forests, black box woodlands, old-man saltbush shrublands, cane grass, lignum swamps and eumong thickets. This reserve is important for protection of regent parrots with over half the known nesting sites in NSW located here. It is also important for other fauna species including several bat species (NSW National Parks and Wildlife Service).

State Forest

Twenty-two state forest blocks in NSW have frontage to the River Murray. The area of state forest blocks with river red gum forest vegetation types is approximately 110,400 ha. All of these state forests are managed as native forests. The Koondrook–Perricoota (31,150 ha), Millewa (20,969 ha) and Mallee Cliff (10,136 ha) state forests comprise a substantial proportion of the river red gum forests in NSW.

South Australia

Conservation Reserve Categories

South Australia has 20,968,720 ha of land within the parks and reserves system, which are reserved under various acts including the *National Parks and Wildlife Act 1972 (SA)*, *Crown Lands Act 1929 (SA)*, and the *Wilderness Protection Act 1992 (SA)*. In total 21.3 percent of the state is reserved for conservation purposes encompassing 333 parks and reserves (see Table 9.13) divided into the following seven categories:

- National Parks are areas considered to be of national importance due to wildlife, landscape features, or Aboriginal or European cultural heritage.
- Conservation Parks are areas for conserving wildlife or the natural or historic landscape features.
- Wilderness Protection Areas (WPAs) protect areas that are natural or remote under the *Wilderness Protection Act 1992*.
- Games Reserves are set aside to protect wildlife and for the management of game for seasonal hunting.
- Regional Reserves were established to conserve wildlife or natural or historic features, while allowing responsible resource utilisation.
- Recreation Parks are areas managed for public recreation and enjoyment in a natural landscape.
- Conservation Reserves are areas reserved for conservation of natural and cultural features under the *Crown Lands Act 1929*.

The different types of parks and reserves are shown in

Table 9.13. Of the public land reserved, over 50 percent (9,712,348 ha) is regional reserves, which comprises 9.9 percent of the total area of South Australia.

Conservation parks make up 5.9 percent (5,851,673 ha), and national parks comprise 4.6 percent (4,546,663 ha) of the total area of the state. In total, 20.4 percent of the state is protected under the *National Parks and Wildlife Act 1972 (SA)*. In comparison, only 0.14 percent (139,621 ha) of the state's reserves are managed under the *Crown Lands Act 1929 (SA)*.

In the Riverland near the Victorian and South Australian border, there are three game reserves located on the Murray River, Chowilla (18,082 ha) which abuts the border with NSW and Victoria, Moorook (1248 ha) and Loch Luna (2070 ha) further downstream. North of Chowilla Game Reserve is Chowilla Regional Reserve (75,036 ha) and Dangalli Conservation Park (252,079 ha). The Murray River National Park (13,023 ha) is located within the Murray River corridor and consist of three discrete blocks, as well as the Pike River Conservation Park (227 ha), and Maize Island Lagoon Conservation Park (215 ha).

State Forest

Within South Australia, there are some blocks of state forest along the River Murray near the Victorian border. These are Murtho, Lyrup and Mundic blocks, comprising a total area of 2625 ha. South Australia has virtually no areas of native forest managed for timber production. There are however significant areas of softwood plantations in the southeast of the state.

Table 9.13 South Australian protected area system.

Reserve type	No. of reserves	Total area (ha)	Percent of state (%)
<i>National Parks and Wildlife Act 1972</i>			
National Park	21	4,546,663	4.62
Conservation Park	232	5,851,673	5.94
Recreation Park	14	3171	<0.01
Game Reserve	10	25,794	0.03
Regional Reserve	7	9,712,348	9.86
<i>Wilderness Protection Act 1992</i>			
Wilderness Protection Area	9	689,451	0.70
<i>Crown Lands Act 1929</i>			
Conservation Reserve	40	139,621	0.14
Total (State total area 99,515,752 ha)	333	20,968,721	21.28

