

# Parks and reserves of the Lake Muir, Perup, Kingston, Tone and Unicup area

Issues Paper

November 2008



Department of Environment and Conservation

Conservation Commission of Western Australia

# A. INTRODUCTION

The Conservation Commission of Western Australia (Conservation Commission), through the agency of the Department of Environment and Conservation (DEC, or the Department), is preparing a Draft Management Plan (DMP) for the *parks and reserves of the Lake Muir, Perup, Kingston, Tone and Unicup area*.

An Issues Paper is a means of informing and assisting the public in participating in the management planning process. The 'Have Your Say' brochure invites the community to register their interest and provide any comments that they would like DEC to take into consideration during the preparation of the DMP. The 'Have Your Say' brochure is released at the same time as this Issues Paper, and both can be found on DEC's website at <http://www.dec.wa.gov.au/community-and-education/have-your-say/have-your-say-on-draft-plans-in-preparation.html>.

This Issues Paper highlights the values and main management issues associated with the parks and reserves of the Lake Muir, Perup, Kingston, Tone and Unicup area. These issues are collated from within the Department, from the previous DMP for Perup and Lake Muir, and from previous discussions with some key stakeholders.

Public participation during other stages of the management planning process will involve:

- ❖ establishment of a community advisory group to provide input to the DMP from a cross-section of the community;
- ❖ consultation with the Commonwealth Government in relation to the management of the Ramsar-listed wetland and its values and threats; and
- ❖ consultation with the relevant local governments, Ministers and other State government agencies; and
- ❖ release of a DMP for public comment.

## 1. BRIEF OVERVIEW

- ❖ The parks and reserves of the Lake Muir, Perup, Kingston, Tone and Unicup area are located in the heart of the Southwest roughly equidistant between the towns of Boyup Brook, Bridgetown, Kojonup and Manjimup and settlements of Rocky Gully and Frankland (see Map).
- ❖ A DMP for *Perup and Lake Muir/Unicup Nature Reserves* was released for public comment in October 1998. The plan was awaiting approval by the Minister when there was a change in Government in 2001. The new Government announced the creation of new parks and reserves throughout the southwest, including the Greater Kingston and Lake Muir National Parks.
- ❖ This DMP covers these new national parks, as well as a number of other adjacent reserves such as Lake Muir, Tone-Perup and Unicup Nature reserves, and is collectively known as the 'planning area'. The total area of reserves managed by the Department within the planning area is about 106,540 hectares (Table 1).
- ❖ The planning area contains the 'Muir-Byenup System' Ramsar<sup>1</sup>-listed wetland of international importance, and is one of the most important areas for fauna conservation in Western Australia.

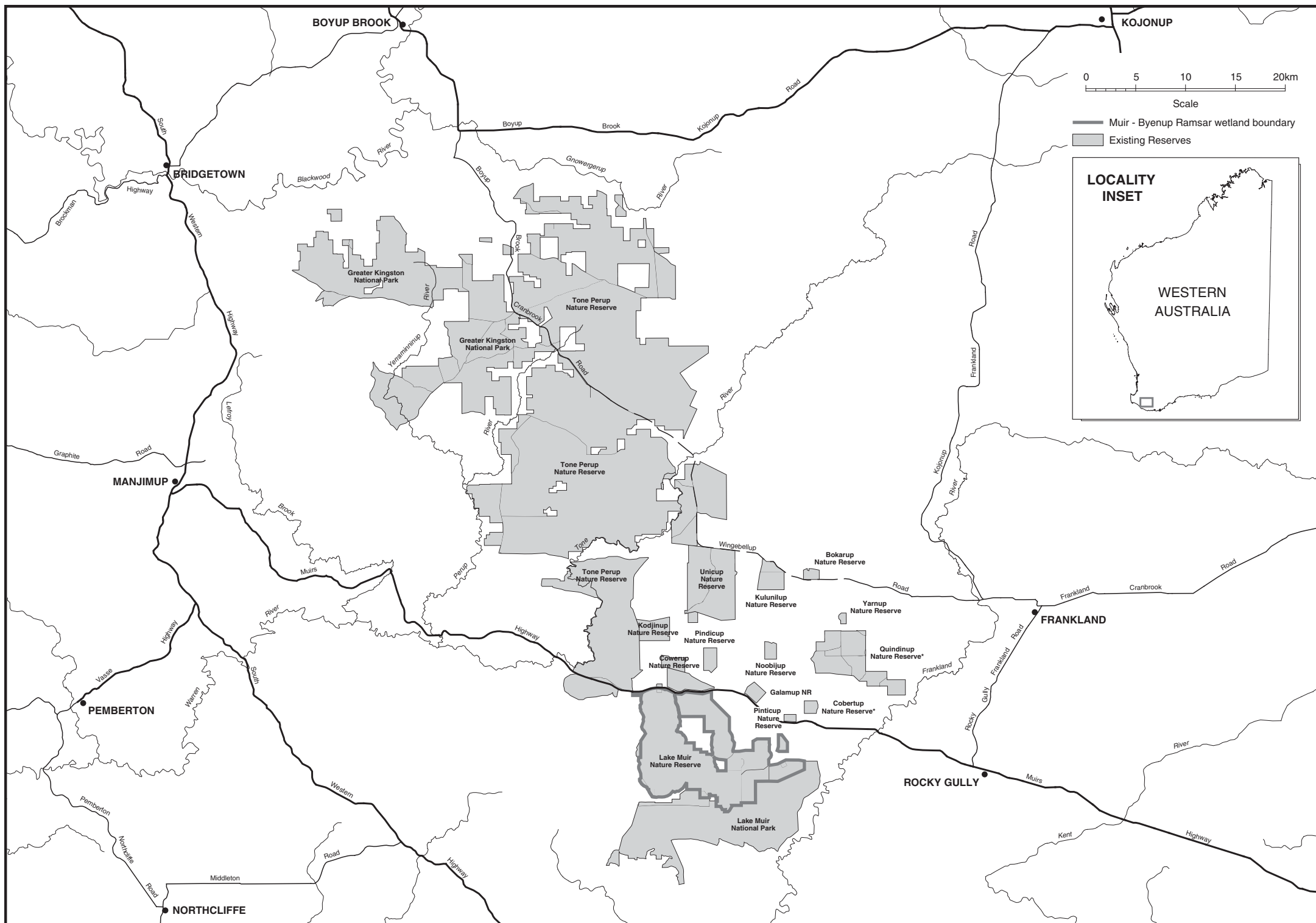
## 2. REGIONAL CONTEXT

Key Values:

- ❖ The planning area is located within the four local government areas of Boyup Brook, Bridgetown-Greenbushes, Cranbrook and Manjimup, and within the 'Southwest' and 'Great Southern' planning regions.
- ❖ Land use within surrounding areas consists largely of State forest to the west and agriculture in the north and east, although there are a number of wineries and timber plantations in the Frankland/Rocky Gully area.

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<sup>1</sup> The Convention on Wetlands, signed in Ramsar, Iran, in 1971, is an intergovernmental treaty for the conservation and wise use of wetlands and their resources (see <http://www.environment.gov.au/water/environmental/wetlands/ramsar/index.html>).



### 3. PLANNING AREA

#### Key Issues:

- ❖ The planning area contains 16 existing conservation reserves (Table 1, Map).
- ❖ Three proposed reserve additions, as nature reserves, remain from the Conservation Commission's *Forest Management Plan* (FMP) 2004-2014<sup>2</sup> (Table 2), which are (i) the 2,160 ha unallocated Crown land and reserves in the Wournbelup/Chowerup area (FMP ID168), (ii) two Shire of Manjimup reserves (FMP ID194), and (iii) the 480 ha unallocated Crown land and reserve in the Bokarup area (FMP ID202).
- ❖ The FMP ID194 proposed reserves (see also *Basic Raw Materials*), may remain in their current tenure, vesting and purpose until no longer required, whereupon they may then be added to the conservation estate.
- ❖ A number of other nearby small Crown reserves and other lands may have conservation value and be worthy of addition to the conservation estate covered by the DMP. The appropriate tenure, vesting, purpose and boundary location of these lands may be addressed, in consultation with local government authorities and other agencies, over the longer term.
- ❖ Several parks and reserves are only provisionally named (Table 1). Naming of these parks and reserves will be addressed by the Department, and to facilitate this, Department is seeking suggestions from the community for names for these parks and reserves. Recommended park/reserve names will be outlined in the DMP, which will seek further community comment on appropriate names for these parks/reserves.

**Table 1. Existing conservation reserves in the planning area.**

Reserve/ Tenure	Reserve No.	Class	Area (ha)	Purpose
Bokarup Nature Reserve	14739	A	146.1	Water, and conservation of flora and fauna
Cobertup <sup>1</sup> Nature Reserve	26681	A	151.0	Water, and conservation of flora and fauna
Cowerup Nature Reserve	33455	Unclassified <sup>2</sup>	270.5	Conservation of flora and fauna
Galamup Nature Reserve	6549	A	221.8	Conservation of flora and fauna
Greater Kingston <sup>1</sup> National Park	47662	A	21092.0	National park
Kodjinup Nature Reserve	26678	A	626.0	Water, and conservation of flora and fauna
Kulunilup Nature Reserve	26677	A	612.0	Water, and conservation of flora and fauna
Lake Muir Nature Reserve	31880	A	11310.8	Water, and conservation of flora and fauna
Lake Muir <sup>1</sup> National Park	47886	A	9625.0	National park
Noobijup Nature Reserve	26680	A	183.1	Water, and conservation of flora and fauna
Pindicup Nature Reserve	26679	A	281.0	Water, and conservation of flora and fauna
Pinticup Nature Reserve	26682	A	75.5	Water, and conservation of flora and fauna
Quindinup <sup>1</sup> Nature Reserve	25506	Unclassified <sup>2</sup>	2653.0	Conservation of flora and fauna
Tone-Perup <sup>1</sup> Nature Reserve	47879	A	55935.0	Conservation of flora and fauna
Unicup Nature Reserve	25798	A	3296.0	Conservation of flora and fauna
Yarnup Nature Reserve	29601	A	61.6	Water, and conservation of flora and fauna
TOTAL			106,540.4	

<sup>1</sup> = only provisionally named.

<sup>2</sup> = proposed for upgrade to A class nature reserve.

<sup>2</sup> See <http://www.conservation.wa.gov.au/downloads.htm>.

**Table 2. Proposed conservation reserves in the planning area.**

Reserve No.	Class	Area (ha)	Purpose	Vesting	FMP reference
UCL		2,147.0			FMP ID168
27925	Unclassified	8.7	Gravel	Shire of Boyup Brook	FMP ID168
30214	Unclassified	4.3	Gravel		FMP ID168
10391	Unclassified	37.5	Parkland rehabilitation, gravel and water	Shire of Manjimup	FMP ID194
10504	A	80.0	Parkland rehabilitation, gravel and water	Shire of Manjimup	FMP ID194
UCL		155.8			FMP ID202
35307	Unclassified	324.2	Government requirements		FMP ID202
	Total	2757.5			

## B. MANAGEMENT DIRECTIONS AND PURPOSE

Key Values:

- ❖ The 10,630 hectare ‘Muir-Byenup system’ became Australia’s fifty-sixth Ramsar-listed wetland in December 1991 on the basis of meeting four Ramsar criteria (see <http://www.environment.gov.au/cgi-bin/wetlands/report.pl> ).
- ❖ Part of the planning area lies within a Natural Diversity Recovery Catchment (see *Hydrology and Catchment Protection*), for which a recovery plan is being prepared.

Key Issues:

- ❖ None of the reserves within the planning area are covered by an existing management plan. The management plan for the whole of the planning area will need to meet Commonwealth obligations in relation to the protection of Ramsar values, and be consistent with the recovery catchment plan.
- ❖ There are 2 currently registered native title claims over the planning area: the Southern Noongar (WC96\_109) and the Wagyl Kaip (WC98\_070). No native title determination has been made. The South West Aboriginal Land and Sea Council is the representative Aboriginal body appointed under the Commonwealth’s *Native Title (NT) Act 1993* for the planning area. Where relevant, the *Native Title (NT) Act 1993* will apply.

## C. MANAGING THE NATURAL ENVIRONMENT

### 5. BIOGEOGRAPHY

Key Values:

- ❖ The planning area is entirely located within the ‘Southern Jarrah Forest’ IBRA sub-region<sup>3</sup>.
- ❖ About 33% of the current extent of vegetation within the ‘Southern Jarrah Forest’ sub-region is protected within formal conservation reserves (Department data as of June 2006). Of this area, 25% is protected within the planning area.

### 6. CLIMATE AND CLIMATE CHANGE

Key Issues:

- ❖ Climate change presents an additional pressure for native species and ecosystems, as well as exacerbating existing pressures such as habitat fragmentation/modification, competition by introduced species and altered fire regimes (see <http://www.dec.wa.gov.au/climate-change/climate-change-and-biodiversity/climate-change-wa.html> ). Whilst some species may

<sup>3</sup> The Interim Biogeographic Regionalisation for Australia (IBRA) divides the Australian continent into 85 bioregions and 403 sub-regions based on major geomorphic features in each bioregion. These units are used for assessing the status of native ecosystems and their protection in the national reserve system (see <http://www.environment.gov.au/parks/nrs/science/bioregion-framework/ibra/index.html> and <http://www.dec.wa.gov.au/science-and-research/biological-surveys/a-biodiversity-audit-of-wa.html> ).

increase in abundance or range, climate change will increase existing risks of extinction of some more vulnerable species and increase loss of biodiversity. Within the planning area, a number of native plant and animal species and communities may be particularly vulnerable to climate change, such as locally endemic species, and wetland flora, fauna and communities.

## 7. GEOLOGY, GEOMORPHOLOGY AND SOILS

### Key Values:

- ❖ The two main types of geological material in the area are Precambrian bedrock and Cainozoic regolith materials (0 to 65 million years old). The Precambrian bedrock unit is divided into two main units: the Yilgarn Craton (Kingston and Perup areas – 2.4 billion years old) and the Albany-Fraser Orogen (Lake Muir/Unicup reserves – 1.2 billion years old). Geology and geomorphology have a strong influence on catchment hydrology where deep weathering of the Precambrian rock produces saprolite that functions to perch wetlands, and the Manjimup Lineaments<sup>4</sup> influences drainage patterns.
- ❖ Climatic conditions, very slow water movement and a shallow lake basin has resulted in the accumulation of peat deposits in Byenup Lagoon, Tordit-Gurru Lagoon and Poorginup Swamp. These peat swamps, which are rare in Australia and in particular Western Australia, strongly influence water quality and provide a very effective filter and buffering capacity and an important habitat for native plants and animals.

### Key Issues:

- ❖ Potential acid sulfate soils<sup>5</sup> (ASS), occur in the planning area, particularly associated with the freshwater peat wetlands in the Muir-Byenup area. Lower water levels in wetlands (through drainage and seasonal drying) and disturbance may expose peat and ASS to air, causing iron sulfides to oxidise producing sulfuric acid, iron precipitates, concentrations of dissolved heavy metals and very low pH groundwater. ASS in the Byenup Lagoon System occur due to land clearing and rising water tables associated with plantation harvesting. Cowerup Swamp has been mined for peat and acidic water drains via artificial drainage channels and Red Lake, into Lake Muir. Poorginup Swamp has ASS, formed during seasonal drying, although installed artificial drains are causing the swamp to dry out earlier than other wetlands.
- ❖ Peat swamps are also at risk of burning during drier parts of the year and, as a result, exposure of ASS.

## 8. HYDROLOGY AND CATCHMENT PROTECTION

### Key Values:

- ❖ The planning area straddles a number of catchments including the Blackwood River, Deep River, Frankland River, Warren River and Lake Muir catchment areas. Major rivers that drain through the area include the Perup and Tone rivers.
- ❖ The planning area contains extensive, varied, unique and significant wetland systems, including an unusual and internationally important Muir-Byenup Ramsar-listed wetland system that comprises a suite of partly inter-connected lakes and swamps of varied size, salinity, permanence and substrate in an internally-draining catchment. Twenty named wetlands and many unnamed permanent and ephemeral wetlands occur in the area, ranging from mainly creeks in the Kingston, Perup and Tone areas to true lakes, sumplands and damplands, some creeks, palusplains and floodplains in the Lake Muir/Unicup and Tonebridge area.
- ❖ The Lake Muir-Unicup catchment is a 'Natural Diversity Recovery Catchment'<sup>6</sup>. Long term strategies include preservation and management of existing remnant vegetation, use of deep-rooted perennial and high water use crops, additional strategically placed high water use trees, and protection and revegetation of drainage lines. Individuals and community groups, in conjunction with State Government agencies, are working together to address catchment issues.

<sup>4</sup> Boundary between Yilgarn Craton and the Albany-Fraser Orogen.

<sup>5</sup> Acid sulfate soils are naturally occurring soils and sediments containing iron sulfides, most commonly pyrite.

<sup>6</sup> A Natural Diversity Recovery Catchment is established under the State Salinity Strategy to help recover and protect significant natural areas, particularly wetlands, from salinity (see <http://www.dec.wa.gov.au/land/salinity/policy-documents-and-reports.html> )



#### Key Issues:

- ❖ Surface and groundwater resources interact within a complex hydrological system dependent on factors such as rainfall, evaporation, landscape position and drainage.
- ❖ The major threats to the wetland ecosystems are rising watertables and increased run-off, and salt loads resulting from clearing in the catchments, although there is variation in the natural hydrology and salinity of the individual wetlands. Other threats include eutrophication, inappropriate fire and erosion and degradation from vehicle access.
- ❖ Long term management strategies within the Recovery Catchment need to encompass the reserves as well as the surrounding lands and waters in the catchment, and will require the cooperation and integration of activities by all land managers, landholders and stakeholders.

## 9. NATIVE PLANTS AND VEGETATION COMMUNITIES

#### Key Values:

- ❖ The planning area contains a profusion of threatened, endemic and relictual<sup>7</sup> native plants and is significant for its diversity, intactness and conservation importance. The Lake Muir/Unicup complex of reserves alone contain about 862 native taxa.
- ❖ The rare wetland-dependant orchids *Caladenia christineae*, *Caladenia harringtoniae* and the tall donkey orchid *Diuris drummondii* are listed under the Commonwealth's *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) and under the State's *Wildlife Conservation Act 1950* (Ramsar nomination criterion).
- ❖ The planning area also contains a rich complex mosaic of vegetation representing forest, woodland, shrub/heath/herbland, wetland, peat swamps and riparian ecosystems, including extensive old growth forest. Jarrah *Eucalyptus marginata* and wandoo *E. wandoo* forest and woodland predominates in the northern parks and reserves, while the Lake Muir/Unicup reserves consist of a mosaic of jarrah and marri *Corymbia calophylla* forest, moonah *Melaleuca preissiana* low forest and rush swamps that are related to soil type, moisture status and salinity.
- ❖ Wet flat vegetation communities are among the few remaining in non-coastal parts of the Southwest, and the reserves contain some of the largest natural sedgelands in Western Australia.

#### Key Issues:

- ❖ A range of threatened and other specially-protected flora and vegetation communities are at risk from a range of direct and indirect threatening processes, such as changed hydrological regimes, environmental weeds, introduced animals, diseases, inappropriate fire and grazing.

## 10. NATIVE ANIMALS AND HABITATS

#### Key Values:

- ❖ The planning area contains a relatively intact suite and high diversity of native animals, and is one of the most important, biodiverse and well-studied areas for fauna conservation in Western Australia, particularly Critical Weight Range<sup>8</sup> (CWR) mammals and waterbirds.
- ❖ A number of small mammals are listed under the Commonwealth's EPBC Act (numbat *Myrmecobius fasciatus*, chuditch *Dasyurus geoffroii* and Western ringtail possum *Pseudocheirus occidentalis*), under the State's *Wildlife Conservation Act 1950* (woylie *Bettongia penicillata ogilbyi*, numbat, chuditch, Western ringtail possum and brush-tail phascogale *Phascogale tapoatafa* ssp. [WAM M434]), and in the 2008 IUCN Red List<sup>9</sup> (woylie, numbat, Western ringtail possum);
- ❖ A number of birds are listed under the Commonwealth's EPBC Act (Muir's corella *Cacatua pastinator pastinator*, Carnaby's black-cockatoo *Calyptorhynchus latirostris*, Baudin's black-cockatoo *C. baudinii* and malleefowl *Leipoa ocellata*), under the State's *Wildlife Conservation Act 1950* (Muir's corella, Carnaby's black-cockatoo, Baudin's black-cockatoo, forest red-tailed black-cockatoo *Calyptorhynchus banksii naso*, malleefowl and Australasian bittern *Botaurus*

<sup>7</sup> Relictual species are those that have evolved when Australia was part of the supercontinent Gondwana.

<sup>8</sup> Refers to mammals with approximately 35g to 5.5kg mean adult body weight that have experienced modern decline.

<sup>9</sup> See <http://www.iucnredlist.org/>.

*poiciloptilus*), and in the 2008 IUCN Red List (Australasian bittern, Baudin's black-cockatoo, Carnaby's black-cockatoo and malleefowl);

- ❖ A number of migratory birds, including Red-necked stint *Calidris ruficollis*, common greenshank *Tringa nebularia* and common sandpiper *Tringa hypoleucos*, are protected under international migratory bird agreements with Japan, China and Korea;
- ❖ The Muir-Byenup Ramsar wetland system is one of the most important moulting sites for Australian shelducks *Tadorna tadornoides* in South-Western Australia (Ramsar nomination criterion);
- ❖ Lake Muir, Byenup Lagoon and Tordit-Gurup Lagoon provide a drought refuge for tens of thousands of waterbirds (a Ramsar criterion), and up to 51,000 waterbirds have been counted at Lake Muir, and up to 20,000 waterbirds regularly use Lake Muir;
- ❖ The area is an important refuge and breeding area that supports the Australasian bittern (Ramsar nomination criterion), and the area may still support the presumed to be extinct Lewin's rail *Rallus pectoralis clelandi*;
- ❖ Fish are listed under the Commonwealth's EPBC Act (Balston's pygmy perch *Nannatherina balstoni*) and under the State's *Wildlife Conservation Act 1950* (Balston's pygmy perch and mud minnow *Galaxiella munda*);
- ❖ A number of studies within the Lake Muir-Unicup wetland complex show a high diversity and endemism of aquatic invertebrates, with 1 family and 5 species locally endemic to the area.
- ❖ There are a number of priority-listed species in the planning area including quenda *Isoodon obesulus fusciventer*, Western brush wallaby *Macropus irma*, little bittern *Ixobrychus minutus*, black stripe minnow *Galaxiella nigrostriata*, Doeg's watermite *Pseudohydraphantes doegi* and Poorganup Swamp watermite *Acercella poorganup*;
- ❖ The planning area is potentially valuable as a source and destination for translocations of fauna, and several species (e.g. malleefowl, bilby *Macrotis lagotis*, boodie *Bettongia lesueur lesueur* and tammar wallaby *Macropus eugenii derbianus*) are being investigated.

#### Key Issues:

- ❖ A range of threatened and other specially-protected fauna and habitats are at risk from a range of direct and indirect threatening processes, such as changed hydrological regimes, introduced animals, diseases, inappropriate fire and grazing.
- ❖ In 1996 the woylie was removed from the State and Commonwealth threatened species lists as a result of a recovery program. The State Government has re-listed this species as 'Endangered' due to the rapid and substantial decline of the woylie (see *Diseases and Research and Monitoring*) throughout southwestern Australia since 2001. A referral will be made to the Federal Government to re-list the woylie as threatened under the EPBC Act.

## 11. ECOLOGICAL COMMUNITIES

#### Key Values:

- ❖ While there are no threatened ecological communities in the planning area, a number of ecological communities occur that are of conservation significance, including aquatic invertebrate communities of peat swamps (Priority 2), primary saline wetlands, clay-based herblands, flat-topped yate *Eucalyptus occidentalis* association, and substantial areas of old growth forest.

#### Key Issues:

- ❖ The diverse and important forest/woodland thicket and wetland communities are the most sensitive to disturbances from a range of potential threatening processes such as salinity, acidity, drainage, disease and inappropriate fire.

## 12. ENVIRONMENTAL WEEDS

#### Key Issues:

- ❖ Environmental weeds<sup>10</sup> have potential for serious impact on natural systems and natural values through displacing native plants, particularly on disturbed sites, by competing with them for light,

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<sup>10</sup> See <http://www.dec.wa.gov.au/management-and-protection/plants/environmental-weed-strategy.html> for definition and further information about environmental weeds.



nutrients, water and space. Environmental weeds can also have a significant adverse impact on other conservation values by altering animal habitats, harbouring pests and diseases, and increasing fire hazard.

- ❖ Local high priority weeds for control in the planning area include the EWS 'High'-rated bullrush *Typha orientalis*, watsonia *Watsonia bulbifera*, and the declared<sup>11</sup> cape tulip *Moraea flaccida*.
- ❖ Control priorities will focus on any weed that impacts on threatened or priority flora, fauna or ecological communities, or that occurs in areas of high conservation value, and then address environmental weeds rated under the *Environmental Weed Strategy for Western Australia* (see footnote 9 above) as high, moderate, mild and low in decreasing priority as resources allow.
- ❖ Options for management of environmental weeds in any particular instance include prevention, eradication, control, containment, or do nothing, and involve control methods ranging from managing disturbance, the use of herbicides, biological control, manual control, and control through the application of fire.
- ❖ Whenever possible, programs on lands managed by the Department will be coordinated and integrated with surrounding landholders and community programs.

### 13. INTRODUCED AND OTHER PROBLEM ANIMALS

Key Issues:

- ❖ Problem animals<sup>12</sup> have potential for serious impact on natural systems and natural values through direct effects such as predation, habitat destruction, competition for food and territory, introduction of disease, and through environmental degradation by selective grazing and accelerating erosion.
- ❖ The most significant introduced species in the planning area are the feral fox *Vulpes vulpes*, cat *Felis catus*, rabbit *Oryctolagus cuniculus*, pig *Sus scrofa*, red deer *Cervus elaphus*, goats, horses *Equus caballus* and cattle. The Western Shield control program for foxes has been implemented through much of the planning area, and continues to be successful. The control of cats has been less successful. The rabbit *calicivirus* has had limited effect and, although *myxomatosis* is well established, rabbit numbers remain moderately high with regular seasonal fluctuations. Trapping programs continue for the feral pig.
- ❖ There are also a number of significant problem native mammals (such as kangaroos and the tamar wallaby), birds (such as the Muir's corella and emu *Dromaius novaehollandiae*) and invertebrates (such as the marri spitfire *Perga* sp., gum leaf skeletoniser *Uraba lugens* and the Helena gum moth *Opodiphthera helena*).
- ❖ Whenever possible, programs on lands managed by the Department will be coordinated and integrated with surrounding landholders, community programs and groups, such as the Denbarker Feral Pig Control Group.

### 14. DISEASES

Key Issues:

- ❖ *Phytophthora cinnamomi* is the most significant plant pathogen in the planning area. A large number of susceptible native plants are killed by *P. cinnamomi*, which can irreversibly change the composition of many plant and animal communities. In particular, jarrah forest and woodlands, flats and swamps are vulnerable to infection by *P. cinnamomi*. *P. cinnamomi* is spread by water and soil movement, and persists and grows in plant roots. *P. cinnamomi* can be managed using a variety of strategies, including implementing hygiene practices, restricting access and phosphite treatments of areas of high conservation value.
- ❖ Much of Greater Kingston National Park and Tone-Perup Nature Reserve are gazetted as Disease Risk Areas (DRA). Access in these areas is controlled by a permit system under section 82 of the *CALM Act*, Part 16 of the *Forest Management Regulations*, and Department policy.
- ❖ Although broad-scale dieback mapping has been completed, further survey and monitoring is required to determine the distribution and extent of *Phytophthora* dieback.

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<sup>11</sup> Declared under the *Agricultural and Related Resources Protection Act 1976* (as of May 2008).

<sup>12</sup> Problem animals are feral or introduced species that have become established as wild or naturalised populations, or native species that impact on natural and agricultural values.

- ❖ Other plant pathogens occurring in the planning area that may also have an impact include armillaria root rot *Armillaria luteobubalina*, marri canker *Quambalaria coyrecup*, and other cankers and rusts.
- ❖ The rapid and substantial decline of woylies throughout southwestern Australia since 2001 is being linked to disease as the likely primary and ultimate agent of decline (see footnote 24).
- ❖ Other fauna may be at risk of infection with the chytrid frog fungus, psittacine circoviral (bird beak and feather) disease, and *Thelohania* freshwater crayfish disease.
- ❖ The potential for pathogens to be transported with animals and trapping equipment or transferred direct to other species, needs to be considered in planning captive breeding programs, fauna translocations and research and monitoring programs.

## 15. FIRE

### Key Values:

- ❖ There has been a long history of fire occurrence in the planning area.
- ❖ Fire is an important disturbance factor that has influenced, and continues to influence, the biodiversity of all natural ecosystems. Many species have a variety of traits that enable persistence in this generally fire-prone environment.
- ❖ Fire sensitive species and ecosystems are most typically associated with moister parts of the landscape (e.g. wetlands and riverine communities) and areas with discontinuous vegetation (e.g. granite outcrops).
- ❖ Research projects within and nearby the planning area are improving the knowledge and understanding of fire regimes and the vital attributes of key fire response species. The planning area also contains ten 'Fire Exclusion Reference Areas'<sup>13</sup>.

### Key Issues:

- ❖ Unplanned fire will continue to periodically occur in the planning area, and planning for fire is important in the protection of biodiversity as well as the community.
- ❖ Extreme fire regimes, such as frequent lethal or infrequent intense fire regimes, are more likely to be most damaging to natural values. Some areas adjacent to private property have historically been burnt very frequently and now have little or no understorey species, particularly legumes.
- ❖ A fire management system for the planning area will aim to maintain a diversity of seral stages<sup>14</sup> across the landscape based on vital attributes of key fire response species. Biodiversity will be maintained by varying interval, season, intensity and placement of fire throughout the landscape, and accounting for wildfires. Patchiness of burning is an important factor in providing environmental heterogeneity at a local level.
- ❖ Fire will also be used in a planned way to reduce the potential severity of wildfire events and, in turn, provide safety to fire fighters, neighbours and visitors as well as protection of community assets.
- ❖ The Master Burn Plan process<sup>15</sup> will achieve strategic biodiversity conservation and community protection fire management objectives in the planning area through the production of indicative rolling six-season and one-year burn programs, which are modified each year on the basis of what was burnt previously, improving conservation knowledge and community input.
- ❖ The inter-relationships between vegetation (such as thickets of heartleaf *Gastrolobium bilobum* and mohan *Melaleuca viminea*), native animals (such as CWR tammar wallaby and woylie) and fire are particularly important, where a number of species require particular fire regimes to protect and regenerate suitable habitat.

<sup>13</sup> Fire Exclusion Reference Areas (FERA) are areas from which fire has been deliberately excluded to provide a reference site for scientific studies of the effects of fire on the environment. FERA are broadly representative of the landscape, generally in the order of up to 500 hectares, and long unburnt.

<sup>14</sup> Seral stages are the developmental stages of an ecological succession.

<sup>15</sup> See <http://www.dec.wa.gov.au/fire/prescribed-burning/planning-for-prescribed-burning/planning-for-prescribed-burning.html>.

## 16. ECOSYSTEM REHABILITATION

### Key Issues:

- ❖ Within the parks and reserves there is, and from time-to-time will be, a need to rehabilitate areas associated with fire suppression (e.g. fire trails), mining/exploration (e.g. disused gravel and sand pits), roads and tracks (e.g. disused tracks or tracks that are no longer required), recreation (e.g. site closure or redevelopment) and the provision of services (e.g. power and communication infrastructure, and pipelines).
- ❖ Appropriate methods for rehabilitation can minimise environmental impacts and visual amenity, and should promote natural regeneration of native vegetation in the first instance, followed by the use of local native species grown from seed or cuttings obtained locally to restore the area as far as possible to the original species diversity, composition and spacing.

## D. MANAGING OUR CULTURAL HERITAGE

### 17. INDIGENOUS HERITAGE

#### Key Values:

- ❖ Aboriginal people have a long association with the planning area. Wetlands, in particular, attracted Aboriginal people due to the variety of edible plants and animals and abundant water supply.
- ❖ Most of the northern extent of the planning area lies within the traditional occupancy of the Kaneang people, although a junction<sup>16</sup> of traditional occupancy areas occurs in the southern part of the planning area with the Minang people (south) and the Pibelmen people (west).
- ❖ About 10 Aboriginal heritage sites on existing conservation reserves are recorded on the Department of Indigenous Affairs site and survey database (<http://www.dia.wa.gov.au/>), although some registered sites cover parts of the Blackwood, Donnelly, Perup and Tone rivers and their tributaries. Another 5 Aboriginal sites are on reserves that are proposed for addition to conservation estate. Aboriginal sites in the area include mythological and ceremonial sites, quarries, kangaroo traps, artefact scatters, burials and camping/hunting sites.

#### Key Issues:

- ❖ There has been limited archaeological survey across the planning area, although there have been some surveys undertaken around Lake Muir.
- ❖ Appropriate approvals under the *Aboriginal Heritage Act 1972* are required to proceed with any works that may affect Aboriginal heritage values.
- ❖ There is a limited amount of information on the traditional life and customs of Aboriginal people in the area from records of observations of early explorers and settlers.

### 18. NON-INDIGENOUS HERITAGE

#### Key Values:

- ❖ The planning area has a rich cultural heritage associated with early settlement and the agricultural industry. The area was first explored by Dr Wilson in 1829, who was then followed by Captain Bannister (1832), Lieutenant Preston, William Clarke (1841) and surveyor A.E. Gregory (1852). The area was first settled in the 1850's after Thomas and Robert Muir, who set off from the Hay River, discovered and named Lake Muir (1852) and moved their flocks to, and established properties in, the area (1856). There has since been a strong historical development of the agricultural and forestry industries in the region.
- ❖ There are a number of significant heritage sites within or adjacent to the parks and reserves including the Unicup Mill remains in Kodjinup Nature Reserve, buildings adjacent to Perup, primary school building (active 1909-1911) in Mordalup Nature Reserve, Settlers Camp in Galamup Nature Reserve, a campsite and well in Lake Muir Nature Reserve used by workers when building the Muir Highway, Bokarup Homestead in Bokarup Nature Reserve, and sheep pens in Yarnup Nature Reserve.

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<sup>16</sup> See <http://www.dia.wa.gov.au/Information/Maps/>.

- ❖ The ‘Lake Muir area’ and ‘Tone – Perup River area’ are the only sites in the area listed on the Australian Heritage Council’s Register of the National Estate<sup>17</sup>.

Key Issues:

- ❖ The identification, protection and conservation of the non-indigenous cultural heritage.

## E. MANAGING VISITOR USE

### 19. VISITOR OPPORTUNITIES

Key Values:

- ❖ Lake Muir Observatory (15,000 estimated visitors in 2006-7) and Perup Ecology Centre (1,100 visitors in 2006-7) are important and popular nature-based tourism sites in the region providing unique recreational and interpretation opportunities associated with fauna conservation and wildlife viewing.
- ❖ The natural attributes, unspoiled environment and remote feel are the principal qualities that appeal to residents of, and visitors to, the area.

Key Issues:

- ❖ There is a limited number and range of visitor opportunities across the planning area, which can be attributed to a number of factors including distances from surrounding towns, a low level of water features (which are always popular visitor destinations), relatively remote and reduced access, and a primary focus of management on the natural environment.
- ❖ The DMP will provide for a range of visitor opportunities that facilitate appreciation of the natural values of the area, within a Regional recreational development and interpretation framework that, in this case, recognises the primary focus of the area on the natural environment.

### 20. VISITOR PLANNING

Key Issues:

- ❖ The Department aims to provide visitors with a wide range of nature-based experiences, whilst ensuring that impacts on the environment are managed within acceptable limits. A range of techniques for managing visitor impacts may be used including site management (e.g. developing facilities and hardening of sites), direct regulation of use (e.g. using zones or ‘visitor management settings’ and restricting intensity of use) and indirect regulation of use (e.g. altering physical facilities and setting eligibility criteria).
- ❖ Visitor management settings (VMS) will be established to provide a range of recreation opportunities, while limiting unintended incremental development and minimising visitor impacts. VMS will guide the Department and Conservation Commission in determining what sort of recreation development may be appropriate within the settings.

### 21. VISITOR ACCESS

Key Values:

- ❖ A variety of access is distributed across the planning area, from sealed roads to four wheel drive tracks and from dedicated public roads<sup>18</sup> (e.g. Muirs Highway and Boyup Brook-Cranbrook Road) to roads and tracks managed by DEC.

Key Issues:

- ❖ Many of the roads and tracks located on DEC-managed lands have developed over many years either on an unplanned basis or in response to timber harvesting, fire management or access associated with agriculture. This has often led to access that is poorly located, in poor condition, difficult to maintain, difficult to rehabilitate and unsuitable for recreation and conservation purposes.

<sup>17</sup> (see <http://www.heritage.gov.au/ahpi/index.html> )

<sup>18</sup> Dedicated public roads have their own road reserve and are managed by either local government or Main Roads WA.

- ❖ Some roads and tracks are used by the rural community to access their properties, and this historic situation will need to be taken into account when considering future access in the area.
- ❖ Some unused Crown road reserves are not best located to satisfy access requirements, are unnecessary, or no longer required.
- ❖ Some access roads and tracks are permanently, seasonally or temporarily closed to the public for management purposes, including for the control of diseases, fire management, flora and fauna monitoring, water monitoring and weed and feral animal control.

## **22. VISITOR ACTIVITIES**

### **Key Values:**

- ❖ The planning area contains terrestrial environments that offer a variety of nature-based recreational and tourism opportunities and experiences, such as bushwalking, day-use, horseriding and wildlife interaction.

### **Key Issues:**

- ❖ There is potential for development of bushwalking opportunities to meet the needs and enhance the experience of visitors, although care will need to be taken in designing and locating walk trails due to climatic conditions, sensitive environments, lack of surface water and isolation.
- ❖ There is potential for development of existing and further low-key day-use opportunities to meet the needs and enhance the experience of visitors.
- ❖ No designated areas for horseriding exist in the planning area. Due to the potential to impact on the area's unique and important natural values, horseriding will need to be managed in accordance with legislative and policy requirements.
- ❖ There is potential for development of scenic drive rails that link existing or potential recreation sites in the area, or other nearby drive trails.
- ❖ Waterskiing has historically occurred on the gazetted waterskiing area at Lake Unicup Nature Reserve. However, waterskiing (i) is generally not permitted on nature reserves managed by DEC, (ii) occurs at two other nearby gazetted waterskiing areas on Shire of Cranbrook reserves at Lake Poorarecup (about 43kms away) and Lake Nunijup (about 63kms away), and (iii) can negatively impact on the environment (disturbance of fauna and degradation of flora, soils and water) and other visitors.
- ❖ Wildlife interaction can present issues of safety to visitors and undue disturbance to the species being observed or its habitat.

## **23. VISITOR ACCOMMODATION**

### **Key Values:**

- ❖ The Perup Ecology Centre is a highly valued site that provides built group or family accommodation for nature appreciation, conferences and training.

### **Key Issues:**

- ❖ There are limited other opportunities for visitor overnight accommodation, including camping, in the planning area, and the management planning process will consider the potential for opportunities in line with opportunities that may exist in surrounding areas.

## **25. VISITOR SAFETY**

### **Key Issues:**

- ❖ A number of factors contribute to visitor risk in the planning area, including climate (e.g. dehydration and sun exposure), overhead hazards, remoteness (e.g. person lost or injured, bogged or broken down vehicle) and wildlife (e.g. snakes, ticks and feral animals).

## 26. COMMERCIAL OPERATIONS

### Key Values:

- ❖ The planning area provides commercial nature-based tourism opportunities that focus on the area's unique and varied range of natural and cultural values. A number of licensed commercial tour operators use parks and reserves within the Warren Region to conduct a variety of tours.
- ❖ There are other leases in the planning area with uses other than recreation and tourism (see *Water Resources* and *Grazing*)

### Key Issues:

- ❖ The degree to which a range of services and recreational experiences are provided through the involvement of private enterprise, while being compatible with other management objectives and providing a financial contribution to help meet the costs of managing the natural resource.

## 27. DOMESTIC ANIMALS

### Key Issues:

- ❖ Domestic animals are not permitted on nature reserves, and are not permitted in national parks except where dogs are required for use by the disabled or for emergency (search and rescue) purposes, and in specifically designated areas. There are no specifically designated areas in the planning area.
- ❖ Some parts of the planning area are baited to control cats and foxes. There may be dangers to pets arising from baiting operations and therefore baited areas are signposted advising people of the dangers posed by the laying of baits.

## 28. LANDSCAPE

### Key Values:

- ❖ Visual landscape management is important in the area's relatively unspoilt natural environment. Special natural landscape features, such as rivers, lakes and wetlands, forests and woodlands and wildflower displays, can be viewed at Lake Muir and other lakes, and along many roads in the area. These landscapes are a vital component of people's enjoyment of the natural environment, with a strong influence on their sense of place and quality of life.

### Key Issues:

- ❖ 'Visual Landscape Management Zones' have been identified across the planning area. Department will manage visual landscape values to ensure that management activities and developments have minimal impact on the landscape character and encourage sensitive management of visual resources along access corridors, tourist destinations, lookouts and prominent natural features.

## F. MANAGING RESOURCE USE

### 30. MINERAL AND PETROLEUM EXPLORATION AND MINING

#### Key Values:

- ❖ A significant proportion of the planning area was identified as having 'high mineral prospectivity' in the Regional Forest Agreement<sup>19</sup>, and the area has been, and continues to be, subject to mineral exploration. Current mineral tenements (including exploration licenses) covering the planning area include E70/3112, E70/3256, E70/3395 and E70/3474 (see DOIR website at <http://www.doir.wa.gov.au/>).

#### Key Issues:

- ❖ Mining<sup>20</sup> can be undertaken in national parks and 'class A' nature reserves under the *Mining Act 1978*. Approval to mine under the Mining Act cannot be given by the Minister administering that

<sup>19</sup> see <http://www.dec.wa.gov.au/forests/regional-forest-agreement/wa-regional-forest-agreement.html> .

<sup>20</sup> As defined in the Mining Act includes exploration, fossicking, prospecting and mining operations.



Act without meeting the requirements of the *Environmental Protection Act 1986*. If approved, applications would be expected to include contributions to reserve management in accordance with the principle of environmental offsets<sup>21</sup>.

- ❖ There has also been mining and general purpose leases over Coverup Swamp UCL for the mining of peat, which is proposed for addition to the planning area.

## 31. BASIC RAW MATERIALS

Key Values:

- ❖ Gravel and sand extraction has occurred in the planning area, and continues to be a potential resource.

Key Issues:

- ❖ Access to basic raw materials<sup>22</sup> (BRM) is becoming increasingly difficult and costly due to the limited resource and quality of materials, and the increasing transport distances.
- ❖ BRM for the construction and maintenance of roads and recreation areas should generally be sourced as far as possible outside the planning area. However, the Conservation Commission will consider extraction where (i) the use of the material assists in the protection and management of the area, (ii) a more environmentally acceptable alternative is not available, (iii) where the material is used within the boundaries or enclaves of the planning area, and (iv) where the environmental cost to the conservation estate on balance is neutral.
- ❖ Some small Crown reserves proposed for addition to the planning area (see *Planning Area*) have gravel resources that are required for use and, as such, may remain in their current tenure, vesting and purpose until no longer required.
- ❖ The extraction of BRM (i) has the potential to impact on natural values, especially the visual landscape, (ii) requires a strategic approach to resource availability and demand, and (iii) requires appropriate and adequate rehabilitation.

## 32. WATER RESOURCES

Key Values:

- ❖ Existing and future drinking water sources in the planning area are protected<sup>23</sup> by the Warren River Water Reserve, Donnelly River Water Reserve and Deep River Water Reserve, also referred to as Public Drinking Water Source Areas (PDWSAs).
- ❖ Watering points are spread across the planning area, and provide a network of fire management assets.
- ❖ There are a number of bores and stream gauging stations maintained by DEC and the Department of Water either in, adjacent to or accessed via the planning area that are regularly and irregularly monitored.

Key Issues:

- ❖ Park and reserve management will need to consider the impact of activities within PDWSAs and on potential water sources, particularly in relation to the provision of visitor services and facilities.
- ❖ There is one lease within Greater Kingston National Park for water from a dam site.
- ❖ Bores, stream gauging stations and watering points require regular access for data collection and/or site maintenance.

## 33. BEEKEEPING

Key Values:

- ❖ Beekeeping has historically occurred within parts of the planning area. There are 8 apiary sites within, and one site adjacent to, the planning area. Of these, only two sites are currently active, with most being classed as 'not-to-be re-issued'.

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<sup>21</sup> Environmental offsets aim to ensure that significant and unavoidable environmental impacts are counterbalanced by a positive environmental gain, with a goal of achieving a 'net environmental benefit'.

<sup>22</sup> BRM includes principally gravel, but also sand, limestone and rock aggregate.

<sup>23</sup> PDWSAs are declared under the *Country Areas Water Supply Act 1947*.

#### Key Issues:

- ❖ Current Department policy allows for support of the apiculture industry, as long as it is consistent with Department's responsibilities in land and biodiversity management. No additional sites will be permitted.
- ❖ A geographical assessment of the suitability for apiary sites and the predicted impact between honeybees and values will be completed during the preparation of the management plan. If specific sites are excluded in the management plan, they will be relocated subject to the availability of alternate suitable sites.

### **34. FOREST PRODUCE**

#### Key Issues:

- ❖ Access to public firewood is a significant social issue. However, the removal of firewood can deplete habitats for terrestrial animals, spread disease and disturb vegetation through access to the resource. Firewood can not be removed from national parks and nature reserves within the planning area. The Department provides public firewood collection areas in nearby areas of State forest.

### **35. GRAZING**

#### Key Issues:

- ❖ There has been a long history of cattle grazing in the area stretching back to the 1850s. However, grazing can have deleterious effects on the environment such as impacts on soil and water characteristics (e.g. increasing soil compaction), the introduction and spread of weeds, impact on native plants and habitats such as freshwater fauna and fringing vegetation. Within the parks and reserves, grazing occurs from native animals such as kangaroos, as well as introduced species such as rabbits, deer, goats, horses and cattle.
- ❖ There is one lease within Tone-Perup Nature Reserve for grazing.

### **36. PUBLIC UTILITIES AND SERVICES**

#### Key Values:

- ❖ Public utility infrastructure within the planning area, such as electricity, water and communications, service the towns and rural areas within, adjacent to or nearby the planning area.

#### Key Issues:

- ❖ The provision of new services and infrastructure has the potential for impacts on the environment such as the clearing of vegetation, introduction and spread of dieback and weeds, visual impacts and the destruction of important habitats. It is important to ensure that there is a process of environmental assessment so that potential impacts are assessed and minimised.

## **G. INVOLVING THE COMMUNITY**

### **37. COMMUNITY INFORMATION, INTERPRETATION AND EDUCATION**

#### Key Values:

- ❖ The planning area contains regionally significant quality interpretive and experiential recreation sites, such as the Lake Muir Observatory and the Perup Ecology Centre.
- ❖ Opportunities are provided for visitor education and interpretation of wetland and fauna conservation values through a variety of media such as signs, resource materials, interpretive displays, guided activities, DEC's website (<http://www.dec.wa.gov.au>) and personal contact with rangers or other staff.

#### Key Issues:

- ❖ Information, interpretation and education can enable visitors to (i) plan their visit to the parks and reserves, (ii) find their way to specific features and attractions, (iii) understand the type of

behaviour and actions that are appropriate in parks and reserves; and (iv) learn about, appreciate and value the natural environment they are experiencing. There is potential for development of further information, interpretation and education opportunities to enhance the experience of visitors.

## 38. COMMUNITY INVOLVEMENT AND VOLUNTEERS

### Key Values:

- ❖ Opportunities are provided for community involvement in managing the region's unique wildlife. Volunteer programs and activities, which are effective means of involving the community, include the Bushranger program for school children and assisting in a number of nature conservation activities (e.g. weed control, fauna monitoring) and visitor services activities (e.g. visitor surveys, maintenance of facilities).

### Key Issues:

- ❖ Effective community participation is an essential component of management, providing a forum for the community to contribute to the management of the area and be informed about values, planning and management of terrestrial reserves.
- ❖ Liaison with Aboriginal people, neighbours, local authorities, agencies, other natural resource land managers and community organisations can enhance integrated land management, and is important when management issues such as fire, weeds and feral animals go beyond the boundaries of the parks and reserves.

## H. RESEARCH AND MONITORING

### Key Values:

- ❖ The planning area is one of the most important areas for long term ecological research in WA, with an extensive body of research and monitoring knowledge built up since the 1970's. Perup has been a long-term focus for small mammal research and monitoring.
- ❖ The planning area provides valuable opportunities for research and monitoring of a wide range of unique and important natural values.

### Key Issues:

- ❖ The Woylie Conservation Research Project<sup>24</sup> focuses on the underlying factors responsible for the recent rapid and substantial decline of the woylie.
- ❖ The Kingston area has a considerable program of fauna research associated with the impacts of timber harvesting and fire, particularly focussing on the ringtail and brushtail possums.
- ❖ There is a significant hydrogeological monitoring and surveying program within the Lake Muir-Unicup Natural Diversity Recovery Catchment (see *Hydrology and Catchment Protection*).
- ❖ While fauna recovery over time will gradually switch focus from research to management, the planning area will continue to be an important focus for research and monitoring in WA given (i) the area's relatively intact flora and fauna, (ii) the location of many rare mammals, some of which little is known about (e.g. numbat and phascogale), (iii) the knowledge base within the area from which to base further investigations, (iv) the Ramsar-listing of the Muir-Byenup wetland complex and importance of wetlands for waterbirds, and (v) the extent and impact of threatening processes (e.g. salinity, disease and inappropriate fire).
- ❖ The impacts of threatening processes and management actions need to be regularly monitored and evaluated so that adjustments and refinements might be made. Adequate and appropriate performance indicators are required to assess the plan and measure performance over time. A systematic monitoring and evaluation program to measure the impact of human activities and each of the threatening processes is required and annually documented.

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<sup>24</sup> (see <http://www.dec.wa.gov.au/programs/saving-our-species/woylie-conservation-research-project/the-progress-report.html/> ).

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