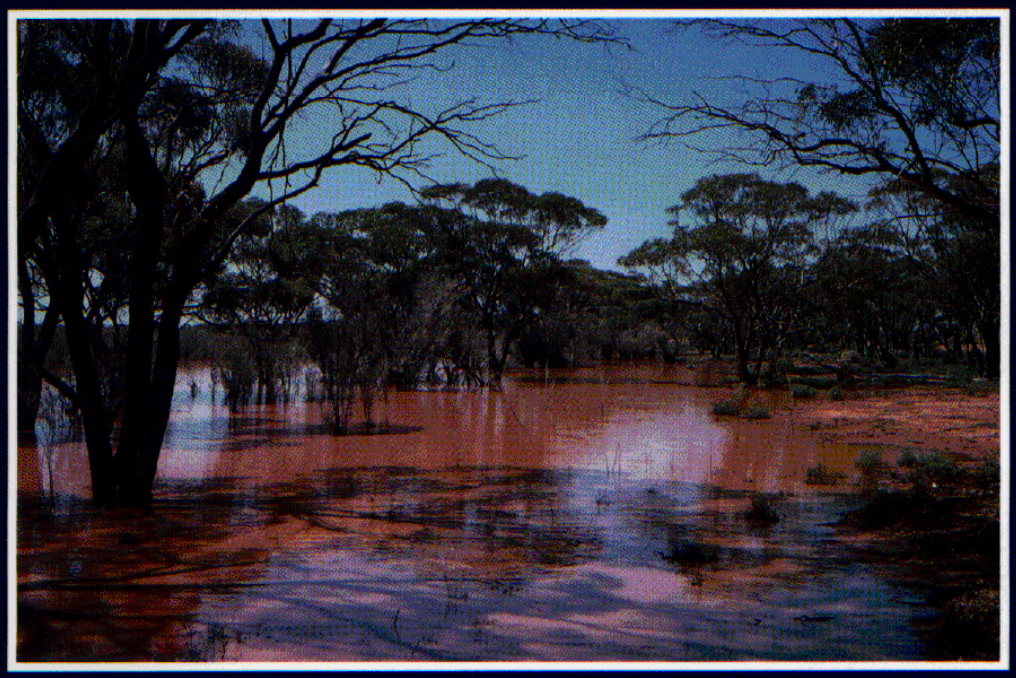
Rowles Lagoon Conservation Park and Clear and Muddy Lakes Nature Reserve

Management Plan

2000—2010



DEPARTMENT OF
Conservation
AND LAND MANAGEMENT
Conserving the nature of WA

Conservation
Commission
WESTERN AUSTRALIA

MANAGEMENT PLAN

Rowles Lagoon Conservation Park

and

Clear and Muddy Lakes Nature Reserve

2000 – 2010

Department of Conservation and Land Management
for the
National Parks and Nature Conservation Authority
Perth, Western Australia, 2000

PREFACE

All national parks, conservation parks and nature reserves are vested in the National Parks and Nature Conservation Authority (NPNCA), and are managed on its behalf by the Department of Conservation and Land Management (CALM).

This management plan is produced as a requirement of Sections 53-61 of the *Conservation and Land Management Act 1984*, which commits the NPNCA to the preparation of management plans for all lands and waters vested in it.

Funding for this plan was provided jointly by CALM and by the Commonwealth Government through Environment Australia. Commonwealth funding was provided through the National Wetlands Program (NWP) under the Natural Heritage Trust (NHT).

Under the financial agreement between the Commonwealth and State Governments, it is a requirement for the plan to be consistent with guidelines established by the Ramsar Convention Bureau (see below) for recommendations regarding the essential character of wetlands and the need for zonation within wetland reserves. As part of the planning exercise the attributes of the Rowles Lagoon system were assessed.

This management plan also contains relevant strategies from the regional management plan released in 1994 for CALM's Goldfields Region.

In accordance with section 55 of the CALM Act, the term of this plan will be for 10 years but a review may take place within the term of the plan.

NOMENCLATURE

Inclusion of a name on the maps or in text of this plan does not necessarily imply it is approved by the relevant nomenclature authority.

ACKNOWLEDGEMENTS

This management plan was prepared for the National Parks and Nature Conservation Authority (NPNCA) under the direction and guidelines of CALM's Planning and Visitor Services Branch.

We acknowledge CALM's specialist branches for their comments on early drafts of this plan and individuals and groups, particularly the Shire of Coolgardie, Doug Daws, Greg Barrett and David Hamlyn who helped to identify issues to be addressed. Greg also provided the preliminary flora list included in Appendix 2. We would like to acknowledge Ken Crawford for providing information on the old dam (see section 23). Many others provided valuable assistance in preparing this plan, particularly:

- staff of the Goldfields Regional Office
- Richard Hammond of CALM's Recreation, Planning and Site Design Section
- Dave Hampton and Jim Williamson of CALM's Parks, Recreation, Planning and Tourism Division
- Rod Properjohn and Melissa Robinson of CALM's Information Management Branch
- Tony Brandis of CALM's Environmental Protection Branch
- Tony Smurthwaite and Chris Kojan of the Department of Minerals and Energy's Land Access Unit
- Liz Thorburn of Environment Australia's Wetlands, Waterways and Waterbirds Unit.

We acknowledge the assistance of Shyama Peebles for her historical research, the Aboriginal Affairs Department for advice on registered cultural heritage sites and Goldfields Mediation Service for information on Native Title Claims.

Data collection and drafting of the plan was undertaken, under consultancy, by Andrew Chapman. The Planning Team was:

- Ian Kealley – Regional Manager
- Rob Thomas – Regional Leader, Nature Conservation
- Chris Portlock – Planning Officer
- Matt Cavana – Technical Officer

Funding for the plan was provided by Environment Australia through the National Wetlands Program (NWP) of the Natural Heritage Trust (NHT). This assistance is gratefully acknowledged.

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OVERVIEW

1. Brief Description

This area comprises two conservation reserves which are located 65 km north north west of Coolgardie in the Eastern Goldfields of Western Australia (WA) (see Map 1). Together, the reserves include most, but not all, of the open waters or dry lake beds and peripheral vegetation of the Rowles Lagoon system of wetlands (see Map 2). The two reserves are:

Rowles Lagoon Conservation Park
Reserve No. 4274 (404 ha) and

Clear and Muddy Lakes Nature Reserve
Reserve No. 7634 (1 926) ha

Both are reserves vested in the National Parks and Nature Conservation Authority (NPNCA) and managed by the Goldfields Region of the Department of Conservation and Land Management (CALM).

The local climate is described as 'semi-desert Mediterranean' (Bagnouls & Gaussen 1957). Annual mean rainfall is 266.8 mm at Coolgardie, the closest meteorological recording station. Rainfall is not strongly seasonal in terms of mean delivery per month but significant rainfall events which recharge the wetland are often associated with rain bearing depressions originating from cyclones of tropical origin over summer months. However this is not always the case. In December 1991 the wetland filled following an intensive local rainstorm and levels were maintained during 1992, which, locally was the wettest year on record. Temperature ranges are strongly seasonal with mean summer maxima of 32.3, 33.3 and 32.3 ˚C in December, January and February respectively, with maxima in excess of 40 ˚C often recorded. The evaporation rate is approximately 2 700 mm per annum, which is 10 times the annual rainfall. Winter temperatures are cool to cold with sub zero minima sometimes recorded.

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2. The Ramsar Convention

The "Ramsar" Convention, as it has become known, is the Convention on Wetlands of International Importance especially as Waterfowl Habitat, which was adopted in the Iranian town of Ramsar in 1971. Up until October 1998 the Convention had 113 member nations. The Convention provides a framework for international co-operation for the conservation and wise use of wetlands, making it the first of the modern global treaties dedicated to the conservation and management of a particular ecotype (ANCA 1996). The Convention endorsed a system of wetlands of international importance, which came to be known as 'Ramsar sites'. There are 49 of these sites in Australia, nine of which are in Western Australia (WA).

Conferences of Contracting Parties (member nations) to the Convention have laid down some important principles for wetland management and use. Although the Rowles Lagoon system of wetlands is not a Ramsar site, it is a condition of the external funding (by Environment Australia) for this plan that some of these principles be incorporated into this management plan. Prominent amongst these principles is recognising the essential character of wetlands and the need for zonation of their use. The "Guidelines for Management Planning for Ramsar Sites and Other Wetlands", produced by the Ramsar Convention Bureau, provides a useful framework for future management. This framework has been adopted for the purposes of preparing this plan.

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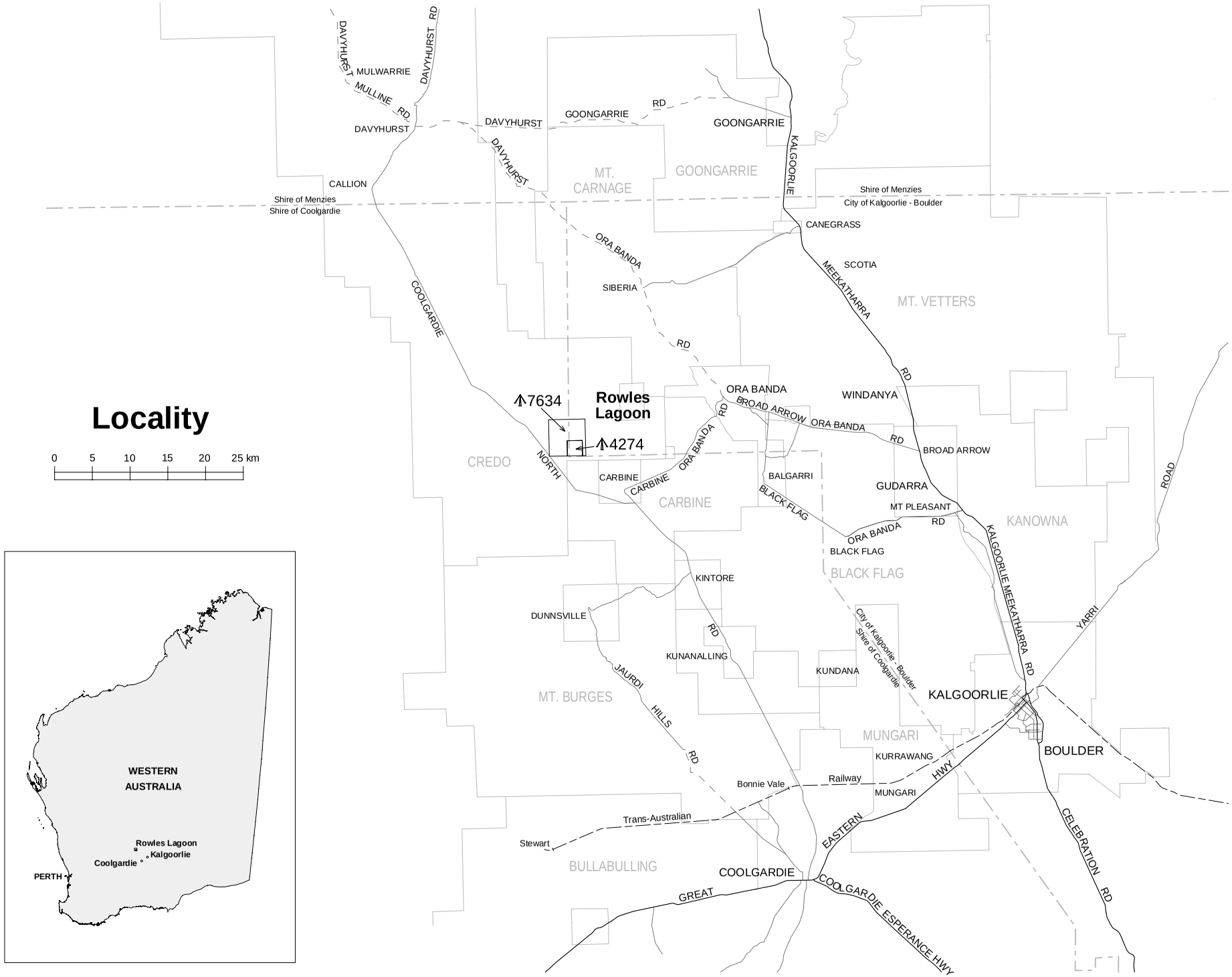
3. Definition of a 'Wetland'

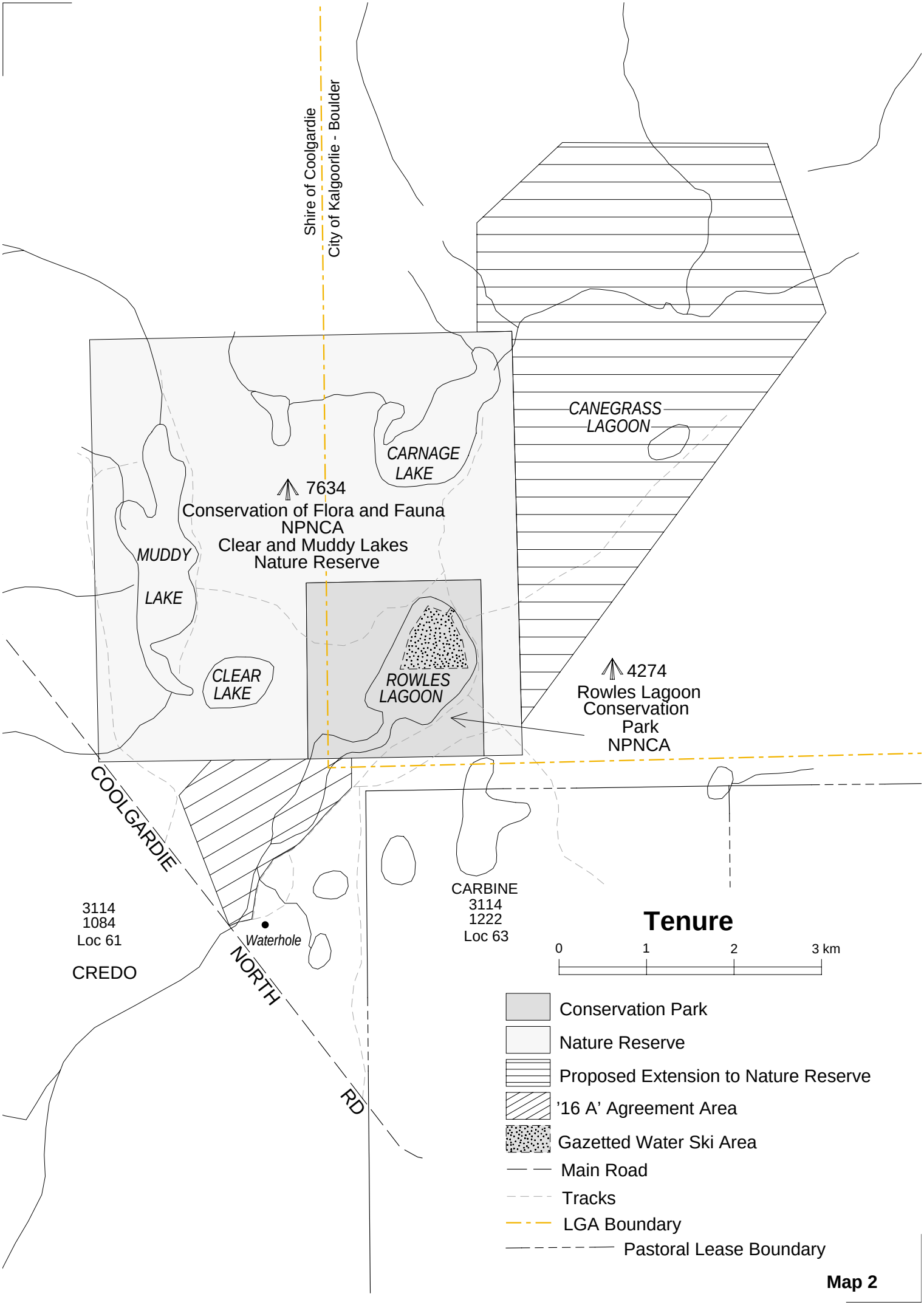
The Ramsar Convention defines wetlands as:

"*Areas of marsh, fen, peatland or water, whether natural or artificial, permanent or temporary, with water that is static or flowing, fresh, brackish or salt, including areas of marine water the depth of which at low tide does not exceed six metres"*

The Government of Western Australia has adopted this definition for the purposes of the "Wetlands Conservation Policy for Western Australia". The significance of this definition is that it recognises that wetlands exist in a wide variety of forms and those wetlands do exist and function even when they are dry. It should be noted that Rowles Lagoon is a deceptive name. It is a lake and not a lagoon, as the latter term usually refers to a 'marine coastal embayment'. In spite of this, the name should be retained as it has strong local and historical associations.


Locality
0 5 10 15 20 25 km
WESTERN AUSTRALIA
Rowles Lagoon
Coolgardie
Kalgoorlie
PERTH
7634
4274
Rowles Lagoon
DAVYHURST RD
MULWARRIE
MULLINE RD
DAVYHURST
GOONGARRIE RD
GOONGARRIE
KALGOORLIE
CALLION
MT. CARNAGE
GOONGARRIE
Shire of Menzies
Shire of Coolgardie
City of Kalgoorlie - Boulder
CANEGRASS
ORA BANDA
SIBERIA
SCOTIA
MEEKATHARRA RD
MT. VETTERS
COOLGARDIE
RD
ORA BANDA
WINDANYA
BROAD ARROW
ORA BANDA RD
BROAD ARROW
CREDO
NORTH
CARBINE
ORA BANDA RD
BALGARRI
GUDARRA
CARBINE
BLACK FLAG
MT PLEASANT RD
KANOWNA
ORA BANDA
BLACK FLAG
BLACK FLAG
KINTORE
DUNNSVILLE
RD
KUNANALLING
KUNDANA
City of Kalgoorlie - Boulder
Shire of Coolgardie
KALGOORLIE MEEKATHARRA RD
YARRI ROAD
JAURDI HILLS RD
MT. BURGES
KALGOORLIE
BOULDER
MUNGARI
KURRAWANG
Bonnie Vale
Railway
MUNGARI
HWY
Trans-Australian
Stewart
EASTERN
CELEBRATION RD
BULLABULLING
COOLGARDIE
GREAT
COOLGARDIE ESPERANCE HWY

Map 1


Shire of Coolgardie
City of Kalgoorlie - Boulder
CANEGRASS LAGOON
CARNAGE LAKE
7634
Conservation of Flora and Fauna
NPNCA
Clear and Muddy Lakes
Nature Reserve
MUDDY LAKE
CLEAR LAKE
ROWLES LAGOON
4274
Rowles Lagoon Conservation Park
NPNCA
COOLGARDIE NORTH RD
3114
1084
Loc 61
CREDO
Waterhole
CARBINE
3114
1222
Loc 63
Tenure
0 1 2 3 km
Conservation Park
Nature Reserve
Proposed Extension to Nature Reserve
'16 A' Agreement Area
Gazetted Water Ski Area
Main Road
Tracks
LGA Boundary
Pastoral Lease Boundary

Map 2

4. Description of the Rowles Lagoon Systems' Wetland Values

The Rowles Lagoon system of wetlands is the only one in the Coolgardie Biogeographic Region that is listed in 'A Directory of Important Wetlands in Australia' (ANCA, 1996). This listing derives from the following criteria:

1) *It is a good example of a wetland type occurring within a biogeographic region in Australia.*

2) *It is a wetland that plays an important ecological or hydrological role in the natural functioning of a major wetland system/complex.*

3) *The wetland is of outstanding historical or cultural significance.*

In particular, this system has importance as a semi-permanent freshwater wetland in a region where most wetlands are saline to hypersaline and contain water for relatively short periods. The system is the largest natural freshwater wetland in the Coolgardie biogeographic region. It has periods of inundation which are longer than any other wetland following significant rainfall events. The reason for this is its unusual catchment and hydrological characteristics as an internally draining 'sumpland'[1], which is not part of a salt lake chain. The semi permanency of the wetlands is confirmed by the record that, between April 1988 and the present, Rowles Lagoon was dry only twice; once in April 1989, and again between November 1990 and December 1991.

The freshwater status of the wetlands is indicated by the following data, which were recorded at the surface of Rowles Lagoon near the centre of the lake (CALM Goldfields files). After initial filling in 1991 the salinity was 80 mg/l TSS[2]. Until the end of 1994 it varied between 200-300 mg/l TSS. After further recharge from cyclone Bobby in February 1995 it declined to 115 mg/l and varied again between 200-300 mg/l until the end of 1996. By way of comparison, the World Health Organisation's international standards for water for human consumption suggests a maximum TSS of 500 mg/l.

With 41 species of waterbirds, including eight protected by international treaty, it has more species recorded than any other arid zone wetland south of the Kimberley. Additionally, Freckled Duck, Australia's rarest waterfowl, has twice been recorded breeding there. These wetlands provide waterbird habitat not found elsewhere in the Coolgardie biogeographic region. For example, in a recent survey of wetlands in the south east arid interior of WA (Chapman & Lane 1997) the Rowles system was the only one to have Blue-billed Duck, Musk Duck, Little Pied Cormorant, Little Black Cormorant and Australasian Grebe. Additionally, Great Crested Grebe, also from the Rowles Lagoon system, has not been recorded elsewhere in this biogeographic region (Storr 1986). These species are more dependent upon freshwater than most in the biogeographic region. In the case of the Little Pied Cormorants, their continual presence is probably due to an introduced crustacean, the Yabby (*Cherax destructor*), upon which they feed.

There has been no long term, systematic or regular monitoring of waterfowl numbers for these wetlands. However, it is possible to make some assumptions based on knowledge of waterfowl biology and opportunistic monitoring of these and other Goldfields wetlands. Species such as Grey Teal, Hoary-headed Grebe and Eurasian Coot breed in vast numbers on inland lakes and move on as they either dry out, or become hypersaline. For example, an estimated 10 000 Eurasian Coots were on Rowles Lagoon on 10 May 1996 (A. Chapman, pers. comm.). Therefore, it is likely that, following a major inundation event in the south east interior and the earlier drying out of the shallow, saline wetlands, that waterfowl numbers could regularly exceed this figure on the Rowles Lagoon system.

Two international treaties, to which the Commonwealth Government is a signatory, are relevant to management of these reserves. The JAMBA (Japan Australia Migratory Birds Agreement) and CAMBA (China Australia Migratory Birds Agreement) are bilateral agreements that commit both countries to provide for the protection of habitat for migratory shorebirds. These birds are those that breed during the northern hemisphere summer, in arctic and sub-arctic locations, and migrate to the southern hemisphere for the northern winter. These birds arrive in Australia's north in August-September and fly south to southern estuaries and lakes. These migrants use inland wetlands as temporary stopovers, usually during the summer months. The obligations arising from the treaties are met in WA through the protection of fauna under the *Wildlife Conservation Act 1950* and by other measures, such as the establishment and management of conservation reserves for these species.

Criterion 2 (above) recognises that wetlands are not always individual entities. They can exist and function as complex systems. Within the Rowles Lagoon system the following four wetland types are present following a major inundation event: seasonal/intermittent freshwater lake; seasonal/intermittent freshwater ponds or marshes; shrub swamps and wooded swamps. Together these provide a wide range of opportunities for feeding, breeding and sheltering, which all contribute to the high numbers of waterfowl that have been recorded here.

[1] A sumpland is a seasonally inundated basin.
[2] TSS – Total Soluble Salts

The Rowles Lagoon catchment includes a series of sumplands with endorheic[3] drainage. For example, Rowles Lagoon itself drains from the south-west, Clear and Muddy lakes from the north-west and Carnage Lake from the north-east (Map 3). This area is entirely in lands managed for pastoral and mining purposes. Confirming the catchment area is one of the objectives of this plan. Preliminary estimates indicate a catchment area of approximately 80 500 ha. Although this is a small area at the landscape scale, it is far in excess of that which is currently reserved (2 330 ha) and emphasises that catchment management, over larger areas, is relevant to the health of the wetland system. This issue is addressed in this plan.

In recognition of its unusual wetland attributes the Rowles Lagoon system of wetlands has been nominated for inclusion in the Register of the National Estate. Although the wetlands have high values for conservation, they also have values for passive and active recreation, nature appreciation and inspiration, as well as an historical and cultural dimension. They also occur in an area with historical and current mining activities. Some of these land uses can be in conflict with conservation and it is the addressing of these issues that is the primary purpose of this management plan.

Response to Submissions:

One of the submissions queried whether the Rowles Lagoon wetland system had been nominated for listing as a Ramsar site.

A consultants report to CALM (Jaensch et al, March 1999) did not recommend the Rowles Lagoon system as a priority for listing as a Ramsar site. At this stage and with the existing level of knowledge, it was considered that, whilst the system is of State and National significance, it does not satisfy the criteria for listing in an international context. This status may be reviewed in the future.

5. History

"Everything has a place in history and Rowles Lagoon is no exception".... (the late) Harry Ware of Coolgardie.

In spite of this, there is a paucity of historical information for the wetlands. Surveyor Middleton named it in 1897 and it first appeared on maps in that year. For the wider region, gold was discovered in Coolgardie in 1892 and commenced the 'rush' to many outlying mining centres. This includes Carbine where the Nordenfeldt Mine commenced production in 1901 (Table 3 in Wyche & Witt 1994). Pastoral settlement followed the 'rush' and Credo Station was taken up in 1906-7. The late Harry Ware records that Rowles Lagoon was certainly well known to the locals of Grant's Patch, Ora Banda, Kununalling, and Carbine during the 1930s as a favourite picnic spot (EGHS records).

6. Public Participation

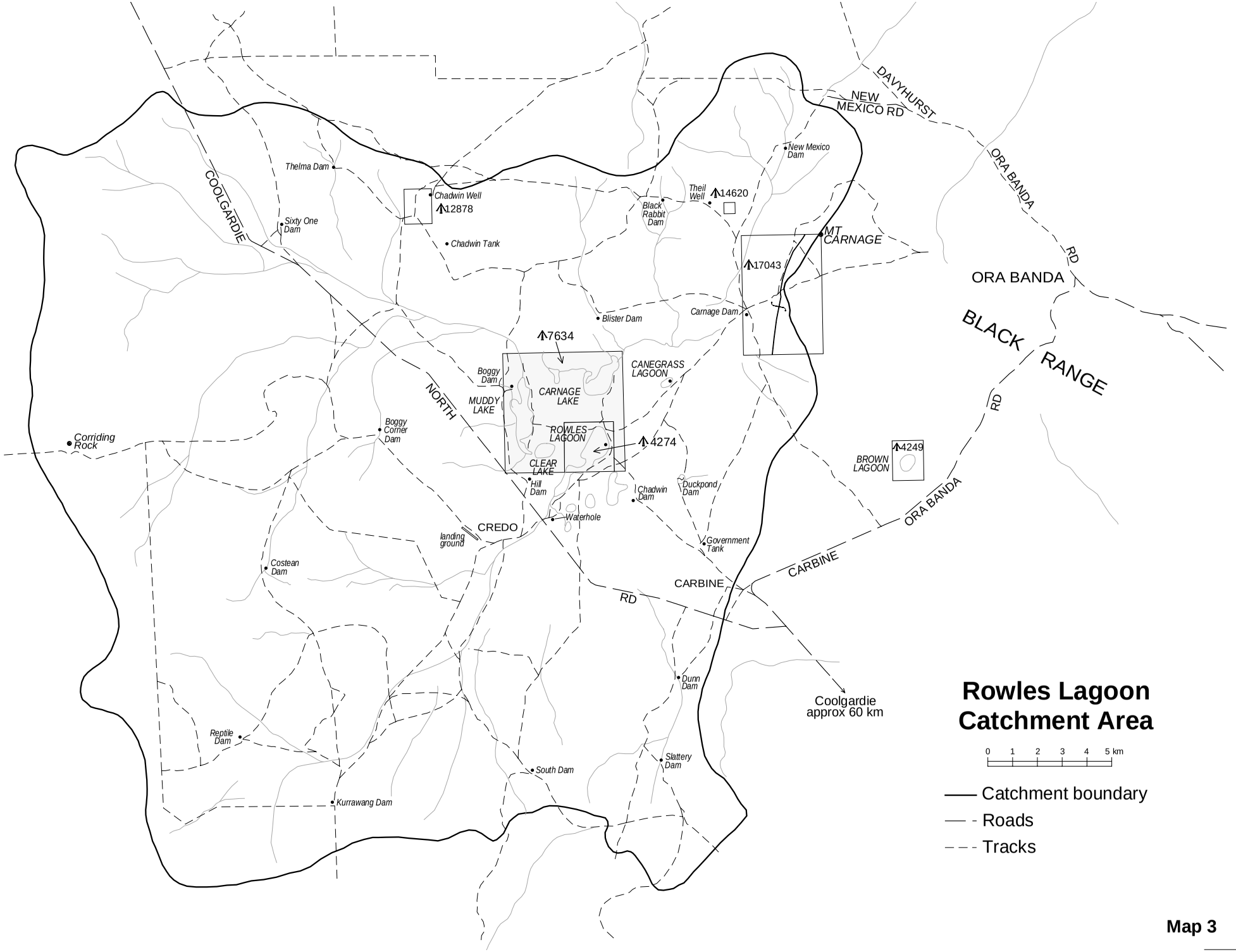
Community input into the preparation of the draft plan occurred through a meeting with the Shire of Coolgardie and a public meeting held in Kalgoorlie. There were approximately 10 participants in the Coolgardie Shire meeting, consisting of both Councillors and staff of the Coolgardie Shire. Three people responded and attended the Kalgoorlie public meeting. The public meeting was advertised through local media releases, and key stakeholders were issued with personal invitations. The City of Kalgoorlie-Boulder declined an invitation for a briefing of issues.

The format of the meetings included an introduction to the values of the Rowles Lagoon wetland system, an introduction to the planning process and the identification of issues. Participants were asked to contribute by identifying issues and provide some initial thoughts on management strategies. All of these issues and strategies have been addressed and included in this plan.

A post-draft meeting was also held in Kalgoorlie on 2 December 1999, with a view to assisting people in developing their submissions. People identified as stakeholders, and those who had already made a submission, were sent personal invitations. The meeting was also advertised through the local media. Approximately 20 people attended the meeting. The main issues raised included water skiing and power boating, erosion, weeds, fencing and the involvement of Aboriginal people in management of the reserves.

The Rowles Lagoon draft management plan was released for public comment on 22 October 1999 for a period of over two months to 7 January 2000. A total of 12 submissions were received, and all comments have been given careful consideration and incorporated into this management plan where appropriate.

[3] Endorheic is a term used to describe areas with terminal lakes and an interior drainage basin.


Rowles Lagoon
Catchment Area
0 1 2 3 4 5 km
Catchment boundary
Roads
Tracks
Map 3
COOLGARDIE
NORTH
CREDO
CARBINE
RD
ORA BANDA
BLACK RANGE
DAVYHURST
NEW MEXICO RD
MT CARNAGE
17043
14620
12878
7634
4274
4249
CARNAGE LAKE
MUDDY LAKE
ROWLES LAGOON
CLEAR LAKE
CANEGRASS LAGOON
BROWN LAGOON
Thelma Dam
Sixty One Dam
Chadwin Well
Chadwin Tank
Theil Well
Black Rabbit Dam
New Mexico Dam
Carnage Dam
Blister Dam
Boggy Dam
Boggy Corner Dam
Corriding Rock
Hill Dam
Chadwin Dam
Duckpond Dam
Waterhole
landing ground
Government Tank
Costean Dam
Reptile Dam
Kurrawang Dam
South Dam
Slattery Dam
Dunn Dam
Coolgardie approx 60 km

7. Goldfields Region Regional Management Plan 1994-2004

In 1994 the Minister for the Environment approved a Regional Plan for CALM'S Goldfields Region. The Regional Plan made the following specific recommendations with respect to Rowles Lagoon Conservation Park and Clear and Muddy Lakes Nature Reserve (see pp. 32, 33; CALM 1994a):

"That Rowles Lagoon Nature Reserve which was recently regazetted as conservation park (Govt. Gazette, 8 April 1994, p.1480) be managed and developed as a recreation area."

"That the conservation status of the Rowles Lagoon system of lakes be enhanced by entering into a Section 16A agreement for management of a portion of land south of Rowles Lagoon Conservation Park including 'the creek' and that options for the incorporation of Canegrass Lagoon into Clear and Muddy Lakes Nature Reserves be investigated."

"That the existing 'C' class Clear and Muddy Lakes Nature Reserve be upgraded to 'A' class[4]."

In recognition of the importance of the lake system, the Regional Plan also allocated a high priority for area management planning over these reserves (see p. 90; CALM 1994a).

MANAGEMENT GOALS AND OBJECTIVES

8. Primary Objectives

The statement of mission adopted in CALM'S *Corporate Plan 2000-2005* is:

IN PARTNERSHIP WITH THE COMMUNITY, WE CONSERVE WESTERN AUSTRALIA'S BIODIVERSITY, AND MANAGE THE LANDS AND WATERS ENTRUSTED IN US, FOR THE APPRECIATION AND BENEFIT OF PRESENT AND FUTURE GENERATIONS.

CALM's primary objective in management of nature reserves, as defined in Section 56 of the *Conservation and Land Management Act 1984* is to "maintain and restore the natural environment and to protect, care for, and promote the study of indigenous flora and fauna, and to preserve any feature of archaeological, historic or scientific interest".

The objective for national parks and conservation parks is "to fulfil so much of the demand for recreation by members of the public as is consistent with the proper maintenance and restoration of the natural environment, the protection of indigenous flora and fauna and the preservation of any feature of archaeological, historic or scientific interest".

[4] Under the *Land Administration Act 1997*, there is no provision for 'C' class reserves. The reserve is now unclassified in terms of Section 41 of that Act (see also Section 12 of this plan).

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9. NPNCA and CALM Management Policies

This management plan is based on NPNCA and CALM policies which are derived from legislation, principally the CALM Act, the *Wildlife Conservation Act 1950* and associated regulations. Policies are available to the public on request.

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10. Management Goals

Management goals and objectives for Rowles Lagoon Conservation Park and Clear and Muddy Lakes Nature Reserve are based on CALM'S primary objectives (see CALM's Corporate Plan 2000-2005):

Conserving Biodiversity: To protect, conserve and, where possible restore, Western Australia's natural biodiversity.

Creating Sustainable Community Benefits: To generate sustainable social and economic benefits through the provision of a range of services, that are valued by the community and are consistent with the principles of ecological sustainability.

Maintaining Community Involvement and Support: To develop community awareness and appreciation of the biological and physical diversity natural to Western Australia and promote community involvement in and support for its protection, conservation and restoration.

Improving The Way We Do Business: To foster a positive work culture of trust, continuous improvement and anticipation of biodiversity conservation issues and customer needs, and deliver core business activities in the most cost effective and efficient manner.

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11. Key Issues for Future Management

The following key management issues have been identified in the preparation of this area management plan:

- provide a means to implement inter-agency catchment management for the wetlands;
- provide further interpretative information on wetland values, systems and processes; and
- manage recreational pressures, particularly when Rowles Lagoon has water in it.

The first two of these are requirements under the National Wetlands Program, which provided funding for this plan.

LAND USE MANAGEMENT

12. Land Tenure

The objective is to ensure that the gazetted purpose, vesting, tenure and boundaries reflects the values and uses of the reserves.

Clear and Muddy Lakes Nature Reserve and Rowles Lagoon Conservation Park are currently unclassified reserves under the provisions of Section 41 of the *Land Administration Act 1997*. Under section 41 of the Act, reserves can be either class 'A' or remain unclassified. It replaced the *Land Act 1933*, under which there were provisions for 'A', 'B' and 'C' class reserves.

Clear and Muddy Lakes reserve (No. 7634) was first gazetted with the purpose of 'water' on 25 January 1901 and re-gazetted on 25 September 1981 as a 'C' class reserve for 'conservation of flora and fauna' and vested in the former Western Australian Wildlife Authority. It is now vested in the NPNCA.

Rowles Lagoon reserve (No. 4274) was first gazetted with the purpose of 'water' on 17 September 1897 and regazetted for 'water and fauna' on 6 July 1956, and vested in the former Public Works Department. Its purpose was changed to 'conservation of flora and fauna' on 17 October 1986 when it was regazetted as a 'C' class nature reserve vested in the NPNCA.

Its purpose, but not vesting, changed further on 8 April 1994 when the Minister for the Environment approved the change to conservation park to enable water skiing to take place. The water skiing area was gazetted on 6 May 1994 under the provisions of Regulation 48A(1)(c) of the *Navigable Waters Regulations*.

Both reserves were formerly classified as 'game' reserves under section 12A(2) of the *Wildlife Conservation Act 1950*. This classification was revoked for reserve 4274 in 1986 and for reserve 7634 in 1992. A ban on recreational duck shooting is in place and means that shooting is illegal on these reserves. The *Acts Amendment (Game Bird Protection) Act 1992* came into operation on 16 June 1992 preventing the Minister from declaring duck shooting seasons under the *Wildlife Conservation Act 1950*.

The principal tenure issues are described in the following sections.

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13. Reserves Management Boundaries

Two options indicated on Map 2 are under active consideration:

- ***Section 16A Agreement with the lessees of Credo Station***

Section 16A of the CALM Act provides a mechanism for CALM and a pastoral leaseholder to enter into an agreement with prescribed conditions for a portion of a lease to be managed for conservation purposes. A Section 16A agreement is a legally binding document made between the Executive Director of CALM and the pastoral lessee. Each agreement is written to achieve specific objectives agreed to by both parties.

- ***A proposed land purchase to include Canegrass Lagoon***

A future option may be to purchase, at market value, those parts of Credo pastoral lease which are within the catchment of the lake system and include Canegrass Lagoon. Map 2 shows an area of some 1 500 ha of the lease for which there has been discussion with the lessee regarding purchase. The benefit to the management of the wetland system is that not only would the wetlands be entirely within the reserves, but that more of the catchment which drains into Carnage Lake would then be excluded from grazing and managed for its conservation value. It is notable that the pasture type 'alluvial plains with saline soils and weakly groved eucalypt woodlands and halophytic understoreys' occupied by the proposed extension has been identified as being grossly under represented in lands managed for conservation in the north-eastern Goldfields (Pringle 1995).

As previously noted, these two proposals were recommended in the Goldfields Region Regional Management Plan (CALM 1994).

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14. Adjacent Lands and Waters

The boundary between the Shire of Coolgardie and the City of Kalgoorlie-Boulder runs north south along the western boundary of Rowles Lagoon conservation park (see Map 2). Therefore, at present, the conservation park is entirely within the City of Kalgoorlie-Boulder local government area, the access track and roads are within the Coolgardie Shire, and Clear and Muddy Lakes nature reserve is within both.

In the event of wildfire and other emergency situations, feral animal control programs and access maintenance, the involvement of two councils has implications for management of the issues. Delay in establishing the appropriate authority in an emergency situation is a relevant example, as is the potential for an

inconsistency in policies between authorities when dealing with some issues.

15. Tenure Status

Unclassified reserve under Section 41 of the *Land Administration Act 1997* does not afford the reserves a level of protection and security of tenure commensurate with their value for recreation, tourism and conservation. An upgrade to 'A' class for both reserves would afford greater security of tenure and protection of biological and recreation values.

The reserves are not fenced on the cadastral boundary, as there are landform and drainage constraints, particularly along the western boundary of Clear and Muddy Lakes Nature Reserve. There is potential to review fencing to establish a more secure, suitable and appropriate demarcation and to review the gazetted boundary with the view to making minor changes. Changes to the cadastral boundary should be surveyed and the boundaries regazetted.

An upgrade to 'A' class for both reserves will require a Land Bill and approval of both Houses of Parliament. 'A' class status for both reserves would also require approval of both Houses of Parliament for a change of purpose. Minor boundary changes to the reserves would only require concurrence between the Minister for Lands and the Minister for the Environment.

Access for mining, including exploration, is subject to the *Mining Act 1978*. Under the current tenure, recommendations from the Minister for the Environment are required for the grant of mining tenements on both reserves. An upgrade in tenure would mean that mining tenement applications would require concurrence of the Minister for the Environment for the Class 'A' nature reserve and the recommendations of the Minister for the Environment for the Class 'A' conservation park. The proposal to upgrade Clear and Muddy Lakes nature reserve was made in the Goldfields Regional Plan (1994) but deferred pending further mineral exploration or an assessment that continuing exploration or mining is detrimental to the demonstrated conservation values of the reserve.

CALM would also consider reducing the size of the conservation park to the minimum size required to accommodate intensive recreational use (i.e. the eastern shore of Rowles Lagoon), if supported by the community. There would be a corresponding increase in the size of the nature reserve over the former conservation park area. This situation will be reviewed mid-term in the life of the plan to determine the need and feasibility of making the change.

STRATEGIES

1. **Negotiate and implement a Section 16A for the area south of Rowles Lagoon conservation park indicated on Map 2. (H)**
2. **Proceed with purchase of part of the Credo Pastoral Lease which includes Canegrass Lagoon as an addition to Clear and Muddy Lakes nature reserve, as indicated on Map 2. (H)**
3. **Investigate with the Shire of Coolgardie and the City of Kalgoorlie-Boulder the relocation of the shire boundary such that the reserves and extensions fall entirely within the Shire of Coolgardie. (H)**
4. **Review fencing and cadastral boundaries of Clear and Muddy Lakes nature reserve and negotiate with neighbouring land managers regarding fencing requirements. (H)**
5. **Survey the boundary of Clear and Muddy Lakes Nature Reserve for regazettal as required. (H)**
6. **Proceed with the proposal to upgrade both reserves to 'A' class status. (H)**
7. **Review recreation use in relation to the area of the conservation park by 2005 and initiate boundary changes as required (L).**

16. Management Zones

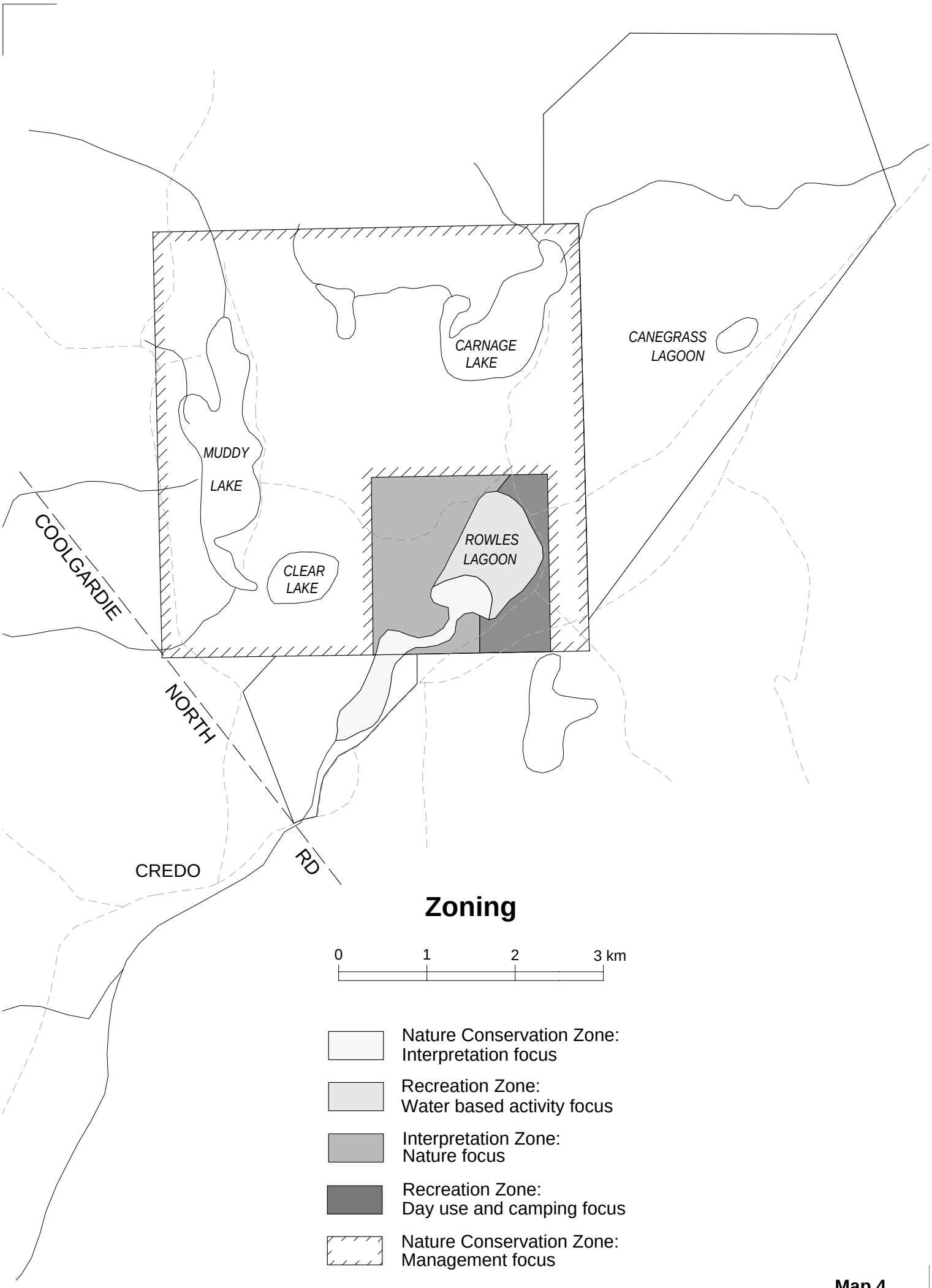
The objective is to manage potentially conflicting uses, particularly conservation and recreation, by allocating them to areas that are consistent with visitor requirements, conservation values and land use capability.

The concept of zoning to manage conservation areas is based on the principle that uses or activities that share similar or compatible requirements can be allocated to designated areas or zones. Allocation can be either spatial or temporal, or both, and is determined by environmental and cultural values, land use capabilities, visitor needs and management considerations. A clear zoning proposal also communicates management intentions to the public. The zoning requirement for these reserves has, in part, already been met by having a conservation park and a nature reserve established over the wetland system (see Map 2 and Map 5). However, further zoning is required in recognition of conservation values and visitor expectations (see Map 4).

STRATEGIES

1. **Restrict further recreational developments and commercial concessions to Rowles Lagoon conservation park. (H)**

2. **Zone the Rowles Lagoon conservation park to accommodate camping, day use and conservation of the natural environment. (M)**



Zoning

0 1 2 3 km

- Nature Conservation Zone: Interpretation focus
- Recreation Zone: Water based activity focus
- Interpretation Zone: Nature focus
- Recreation Zone: Day use and camping focus
- Nature Conservation Zone: Management focus

Map 4

MANAGEMENT FOR CONSERVATION

17. Definition of Conservation

Conservation means different things to different people, the definition adopted here is that set down in The State Conservation Strategy for Western Australia (Dept. Conservation and Environment 1987) and the Western Australian Environmental Protection Act:

Conservation is the management of human use of the biosphere so that it may yield the greatest sustainable benefit to present generations while maintaining its potential to meet the needs and aspirations of future generations.

The conservation strategy for these reserves recognises those external influences that may be both direct (e.g. recreational pressure) and indirect (e.g. human induced changes to the wetlands' catchment), will be the principal focus of management over the ten-year life of this plan.

MANAGEMENT FOR CONSERVATION OF RESOURCES

18. Catchment and Hydrology

The objective is to ensure that water quality and quantity are managed to sustain the biological diversity of the wetland system.

In the absence of accurate historical data it is difficult to determine how natural the present hydrological regime of the wetlands is. It is possible that the current extent of inundation is a response to recent pastoral use of the rangeland, enabling a greater rate of run-on and hence recharge of the lake system. The establishment of the boiler and steam driven pump on the lake bed in 1915, to pump saline water from a well in the lake bed to Carbine Mine, suggests that filling was an infrequent event then. However an article in the 'Coolgardie Miner' on 8 October 1896 referred to a freshwater lake '30 feet deep 10 miles north west of the 43 mile dam'. It is likely that this article was referring to Rowles Lagoon and that extensive filling of the lake did precede pastoral settlement. Furthermore, the establishment of gypsum dunes on the east side of Rowles Lagoon implies that the filling of the Lagoon is not just a recent event, and has functioned as a lake over a geological time frame[5].

In spite of considerations about the 'naturalness'[6] of the wetland system, there is a requirement to manage the rate of change so that the system will continue to support a high level of biodiversity, particularly of waterfowl.

The key to this is to better understand the catchment and the hydrological processes which recharge the wetland and to monitor potential threats which include sedimentation, input of nutrients causing eutrophication, input of other pollutants, and changes to the present groundwater regime.

As a sumpland the lake bed level is above the level of the groundwater table. As there is some evidence that the saline water table is only some metres beneath the lake bed level, there is a requirement to better understand the relationships between the wetland and groundwater systems. The effects of any development proposal, that is likely to impact upon the groundwater regime under the wetlands, must be fully assessed before it is approved. From this point of view, there is a strong case to consider the catchment and groundwater environment of the wetlands as a sensitive area for any environmental impact assessment undertaken by the Department of Environmental Protection (DEP), the Environmental Protection Authority (EPA), the Department of Minerals and Energy (DME) and the Water and Rivers Commission (WRC). This would include assessments of any proposed changes in land use within the area. The catchment should be designated as an "Environmentally Sensitive Area" in regard to mining tenement and water extraction applications[7].

STRATEGIES

1. **Define the hydrological and ecological characteristics of the catchment for the wetland system (H)**

2. **Seek advice from the Water and Rivers Commission on monitoring changes to the water flows in the catchment (H)**

3. **Undertake research on water quality of the wetlands. (M)**

4. **Develop an inter-agency management agreement for the management of activities within the lake system and catchment area. (H)**

[5] Gypsum dunes adjacent to lakes are formed by wind blown sediments from the lake bed which have been deposited as an evaporite ($CaSO_4.2H_2O$) during past inundation and evaporation events.

[6] The concept of naturalness is no different to the situation which applies to most Australian ecosystems, as they are usually in a continual state of change.

[7] Environmentally Sensitive Area refers to a category of land recognised by the Department of Minerals and Energy (DME) and the mining industry – see DME (1998)

5. **Register with the DEP and DME the catchment and groundwater surrounds of the wetlands as an Environmentally Sensitive Area for development of impact assessment procedures. (H)**

19. Geology, Landform and Soils

The objective is to protect and conserve geological features, landforms and soils

In very general terms these reserves, and the Eastern Goldfields generally, are located on Yilgarn Craton or Pre-Cambrian Western Shield geological units. This is a vast, ancient land surface of Australia, which, with its mineralisation, hosts much of the State's mineral wealth. More specifically, the reserves occupy a greenstone belt bounded to the west and north by granitoid rocks and to the north-east by an extensively mineralised area, the Ora Banda Domain. There is some minor greenstone outcropping of variolitic basalt and peridotite near the north-east corner of Clear and Muddy Lakes Reserve (Wyche and Witt, 1994). Greenstone rock forms are known to be prospective for minerals such as gold and nickel. The Carbine mining centre, which produced 1,953 kg of gold between 1901 and 1988, is 7 km south-east of Rowles Lagoon. A localised granitoid sequence called the Rowles Lagoon Monzogranite is south-west of the reserves but just intrudes into the south-west corner of Clear and Muddy Lakes Nature Reserve (Wyche and Witt ibid.).

The reserves occupy a sumpland with local, internal drainage surrounded by very low hills. The lakebeds are lacustrine deposits[8] of silt and clay largely devoid of vegetation when dry. Immediately surrounding the lakes, to a variable width, are sands, silts and clays occupied by a characteristic fringing woodland and thicket vegetation. Further out, and occupying much of the catchment, are shallow brown alluvial loams over clay, which host chenopod shrubland. Where these loams achieve some depth, small pockets of Salmon Gum woodland are present. A particular feature of the reserves' soils is a subdued dune line of gypseous sands on the east side of Rowles Lagoon, which are very fragile, and a favoured warren site for rabbits.

STRATEGIES

1. **Provide interpretative information (per the interpretation plan – see Section 37) on the geology, landforms and soils of the reserves and their vulnerability to damage. (M)**

2. **Identify areas that are vulnerable to damage and develop measures to protect them. (L)**

[8] Lacustrine deposits are those which have been laid down in a lake as a result of inflow of soil from surrounding lands transported by wind and water.

20. Vegetation and Flora

The objective is to protect and conserve vegetation communities and flora with an emphasis on threatened and priority species and water bird habitat.

Vegetation structure of the reserves is determined by topography, soil type and depth and is readily described. The lakebeds when dry are largely devoid of vegetation though there is some lensing of *Halosarcia* sp. just inside the fringing thicket of *Melaleuca xerophila* on Rowles Lagoon. Prior to filling with water in 1991 there was some invasion of the outer lakebed by the environmental weed *Glycyrrhiza acanthocarpa.* This species spread prolifically in moist soil just beyond the high water mark following filling in 1991-95 but had died back by 1998.

There is distinct vegetation zonation on all lakes. Peripheral to the lakebed is *Melaleuca xerophila* in a dense thicket to 5m tall. On deeper soil, but in strict zonation, is woodland of *Eucalyptus gracilis* of varying age, which is dependent on past flood events. This species is killed when inundated, but regenerates prolifically beyond the high water mark. Mature trees are of indeterminate age but there is a well-developed cohort of young trees to 7-8m, which germinated following the flood event of 1973-75. In 1996, regeneration of this species, following the most recent floods (1992 and 1995), was 2.5 m tall. Where the woodland extends beyond the lake fringe into gypseous sands at Rowles Lagoon, *Eucalyptus celastroides* var. *virella* is present.

Beyond the influence of the lakes, but still within the sumpland, a characteristic shrubland with *Maireana sedifolia, Cratystylis subspinescens* and occasionally *Maireana brevifolia* is present on brown loam soils over clay. In small pockets within this vegetation type are small claypans with Canegrass (*Eragrostris australasicus)* and Lignum (*Muehlenbeckia cunninghami*). Also present where the loams are deeper are patches of Salmon Gum woodland. As was the case with *Eucalyptus gracilis,* some Salmon Gums were killed by inundation but there was regeneration to 1m peripheral to the high water mark in 1996.

Other distinctive features of the vegetation are a small greenstone ridge in the north east of Clear and Muddy Lakes nature reserve with *Casuarina pauper* woodland and the following understorey species: *Acacia acuminata, A. tetragonophylla, Maireana sedifolia, Solanum lasiophylum* and *Ptilotus obovatus*. Immediately to the east of Rowles Lagoon is a low ridge of gypseous sandy loam with a characteristic grassland/herbfield with abundant annuals following good rainfall as well as the grasses *Aristida contorta, Bromus rubens* and *Stipa scrabra.*

Unlike the vegetation the flora of the reserve is not well known. There has been some plant collecting by G. Barrett and a small collection made to describe traplines used during a biological survey in the area in 1996 (see Appendix 2). There are no declared rare flora known from the reserves; but there is a Priority 2[9] species, *Rumex crystallinus*, recorded from moist soil in the *Melaleuca xerophila* thicket at Rowles Lagoon, and a Priority 1 species, *Goodenia pusilliflora*, may be present, having been recorded nearby.

STRATEGIES

1. **Complete botanical surveys of the reserves. (M)**

2. **Provide opportunities for community groups and individuals to participate in biological surveys and data collection on the reserves. (L)**

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21. Fauna

The objective is to conserve indigenous fauna and its habitats with particular emphasis on threatened species and those protected by international treaty.

The vertebrate fauna is reasonably well known due to bird recording by Wally Klau, and more recently by officers of CALM in Kalgoorlie, as well as biological survey work done jointly by Goldfields Naturalists' Club and CALM.

In general the fauna of any area is determined by its regional setting, habitats present and the effects of past and present land use practices including presence of feral or introduced species.

The Rowles Lagoon system of wetlands is listed in 'A Directory of Important Wetlands in Australia' (ANCA, 1996). As an arid zone wetland system these reserves offer a specialised case; when filled the wetlands ameliorate the effects of aridity and a wide range of waterfowl arrive from elsewhere and use the wetland either to breed or rest as a stop-over to other wetlands. Some species can be very common and widespread in the arid zone and others, e.g. Blue-billed Duck, Australian Crake and Glossy Ibis, are very infrequent visitors to arid wetlands. They have been recorded here due to the different qualities of this wetland system, particularly its dense fringing thicket vegetation and its water quality.

The situation with terrestrial fauna is very different due to the limited habitats of the reserves and possibly the high number of species and individuals of feral vertebrates. As a sumpland the reserves have very limited terrestrial macro habitats[10] including:

Fringing thickets and woodlands of *Melaleuca xerophila* and *Eucalyptus gracilis* which are narrow bands surrounding each lake. Although these are an integral part of the ecology of the wetland, for ground inhabiting vertebrates they are a very unstable environment due to the flooding-drying cycle with rapid tree deaths and regeneration, and invasion by weeds. There has also been some degradation of this habitat by past tree cutting and compaction of soil by vehicle use.

Bluebush plains with *Maireana sedifolia, M. brevifolia* and *Cratystylis subspinescens* shrubland on red brown sandy loams occupy much of the wetlands' catchment. In a regional sense these are an isolated and restricted habitat which, due to their high pastoral carrying capacity, have in the past been heavily grazed. Accordingly they have a restricted vertebrate fauna, with some interesting characteristics. For example the Fat-tailed Dunnart has been recorded from the reserves. It is widespread elsewhere but infrequently recorded in trapping surveys because it is one of the few native mammals that preferentially venture into open areas. Also present is a small skink *Morethia adelaidensis*, which is more at home on the Nullarbor Plain, and is at the western limit of its range at Rowles Lagoon.

Salmon Gum woodlands occur in pockets on deeper soils within the Bluebush plain. They are small in extent and isolated compared to elsewhere in the Goldfields, but in spite of this, they are home to more species of reptile here than other habitats.

The vertebrate fauna consists of 118 species of birds including 41 waterfowl with seven migratory shorebirds subject to the JAMBA and CAMBA treaties. The Freckled Duck, Australia's rarest waterfowl, has been recorded as breeding here.

The terrestrial species are representative of a semi-arid woodland / shrubland avifauna, in terms of both number and species composition. The presence of both White-browed and Rufous Tree-creeper is unusual, and indicative of the reserves' location, some 50-60 km south of the Mulga woodlands of the Murchison Biogeographic region.

With five species of native mammal and seven introduced species recorded from the reserves, the mammal fauna is depauperate. This is due to both intrinsic and derived factors. As previously noted the habitats are few in numbers, of very limited extent and fragmented. The effects of past grazing by sheep and cattle, as well as very high numbers of both feral cats and rabbits, are likely to have been influential. As elsewhere in semi-arid and arid environments in Australia, mammals have always been most sensitive to the agents of faunal attrition. There are no local data on the past vertebrate fauna of Rowles Lagoon.

[9] Priority flora species in this plan refer to those listed in CALM's 1998 Declared Rare and Priority Flora List (see CALM 1998b).

[10] Macro habitats – large scale areas suitable for sustaining large numbers and diversity of fauna.

Twenty-one species of reptile and one frog have been recorded from the reserves. Appendix 1 summarises the list of vertebrate fauna recorded from the reserves.

A considerable deficiency in knowledge of the reserves is that there are no data on either aquatic or terrestrial invertebrates present.

STRATEGY

1. **Encourage research on the aquatic invertebrates of the wetlands. (M)**

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22. Threatened and Priority Fauna

No species currently classed as "threatened fauna" have been recorded from the reserves. The current list was published in the Government Gazette on 17 December 1999.

Only one Priority[11] listed species, the Freckled Duck (which is described as Australia's rarest duck) has been recorded from the reserves. It is known to have bred at Rowles Lagoon in both 1973 and 1992. Its breeding sites are likely to be either dense inundated *Melaleuca xerophila* thicket or Lignum, *Muehlenbeckia cunnunghami* shrubland. The status of Freckled Duck was reviewed in 1997. It was formerly considered 'vulnerable' but is now classed as 'common and widespread with no evidence of a decline in numbers'. Accordingly, it is allocated to Priority 4 on the List of Priority Fauna as a 'taxon in need of monitoring'. Priority 4 species are:
"taxa which are considered to have been adequately surveyed, or for which sufficient knowledge is available, and which are considered not currently threatened or in need of special protection, but could be if present circumstances change. These taxa are usually represented on conservation lands." (CALM, 1998a).

STRATEGY

1. **Identify and manage accordingly the likely breeding sites for Freckled Duck (M)**

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23. Cultural Heritage

The objective is to identify and protect both Aboriginal and European cultural heritage sites on the reserves.

It is unknown to what extent the wetland system played a part in the traditional lives of Aboriginal people and comments under Section 18 as to how long the wetlands have filled, are relevant. Certainly, wetlands elsewhere in the Goldfields do show signs of past traditional use, whether this was largely for hunting of game and/or for ceremonial or other purposes is unknown. There are no registered Aboriginal cultural sites within the reserves. As a matter of principle, CALM is committed to providing protection of sites on lands under its management. CALM is also bound by the *Aboriginal Heritage Act 1972*, which makes it an offence to alter a site in any way without written permission of the Minister for Aboriginal Affairs. This applies whether or not the site is known to the Aboriginal Affairs Department.

European historical associations with the reserve include the establishment of a boiler and steam driven pump over a well in the Rowles Lagoon lakebed in 1915, to pump saline water to the battery at Carbine mining centre. The water resource of the lake was also used for stock on Credo Station, which was established in 1906-7. Former Credo pastoral lessees, Morry Halford and Robert Crawford, dug the dam on the edge of Rowles Lagoon in the 1950s. Robert Crawford's son, Ken Crawford, recalls that his father said they encountered salt water 'at between 6 and 8 feet'.

STRATEGIES

1. **Carry out research into identifying sites of European historical significance. (H)**

2. **Liaise with the Aboriginal Affairs Department and Aboriginal communities to identify sites of traditional Aboriginal significance. (H)**

3. **Maintain a register of culturally significant sites to ensure recreational and management initiatives do not impact detrimentally upon them. (H)**

4. **Where appropriate incorporate material on the cultural heritage of the area in interpretative displays (per the interpretation plan – see Section 37). (H)**

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24. Landscape Management

The objective is to identify, protect and restore the reserves' landscape qualities

As a semi-permanent freshwater wetland in a generally arid environment, the lakes have an aesthetic and landscape dimension, which is in addition to their conservation and biological properties. The wetlands fall within the 'Kalgoorlie Plain' landscape character type and the visual quality classification is 'high scenic quality' (CALM 1994). The wetland viewscape, when seen from the shade of the surrounding woodland, and the opportunity to have a picnic here, is an unusual opportunity in an arid landscape. Therefore the wetlands have very high scenic qualities by Goldfields standards.

[11] Priority fauna in this plan refer to those listed in CALM's 1998 Threatened and Priority Fauna Lists (see CALM, 1998a)

Table 1.
LANDSCAPE MANAGEMENT GUIDELINES (REPRODUCED FROM (CALM 1997))

Landscape Management Guidelines
· Alterations to the natural landscape should be subtle, remaining subordinate to natural elements by borrowing extensively from form, line, texture and scale found commonly in the surrounding landscape; · A site development plan, at an appropriate scale, should be completed and approved before any development, maintenance or rehabilitation works are implemented; · Degraded landscapes, e.g. gravel pits and disused vehicular access tracks, should be rehabilitated after use; · Essential firebreaks should follow natural landforms, vegetation or landuse patterns/breaks; · Prescribed burning., if required, should be done before periods of high vegetation growth (where possible) and incorporate minimal visual impact prescriptions and techniques; · Previously disturbed areas within areas of high scenic quality should be given the highest priority for rehabilitation until the desired standard of scenic quality is attained; and · Where environmental or visually incongruent facilities or activities are essential, the degree of resource value lost should be assessed, controlled by management and carefully monitored.

In accordance with CALM's landscape management classification system, conservation reserves are managed with the objective of landscape preservation. This objective recommends that any landscape alteration should allow for little more than natural change, or very low impact changes that are carefully planned to accommodate and/or enhance the reserves' special visual qualities. Landscape management ranges from broad scale to site specific and includes planning, design and construction. Table 1 lists guidelines that will be used for landscape management planning.

STRATEGIES

1. **Identify and protect the important landscapes in the reserves. (H)**

2. **Implement CALM Policy No. 34 (Landscape Management on Lands and Waters managed by CALM) in all aspects of management of the reserves. (H)**

3. **Take into consideration the landscape management guidelines set out in Table 1. (M)**

4. **Identify disturbed areas which may need visual enhancement. (L)**

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25. Plant Diseases

The objective is to prevent the introduction of known or unknown plant diseases.

Although the reserves are outside the area known to be susceptible to dieback-type diseases, there is a requirement to adopt vigilant and precautionary principle[12] management operations with respect to use of machinery and import of gravel or other raw materials.

[12] Precautionary principle highlights the caution that is required in making decisions when there is a risk of irreversible environmental degradation (Panetta and Scott 1995).

This would involve adopting machinery and material hygiene procedures to ensure plant diseases are not introduced into the reserves. Identification of and certification of gravel and raw material pits and machinery washdown are major components of the hygiene procedures. Similar procedures would be required for weed control within the reserves.

STRATEGY

1. **Adopt machinery and raw material hygiene procedures to minimise the risk of plant diseases being introduced into the reserves. (H)**

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26. Fire

The objective is to protect people, property and conservation values in and around the reserves.

Wildfire in the Goldfields woodland environments is a relatively infrequent event, due to the generally low flammability and sparseness of vegetation. However, fire control is an important component of management because recovery from fire is slower than in wetter areas and plants generally are not as well adapted to fire.

Lightning or people ignite fires which can become wildfires if there is sufficient vegetation cover for it to spread. The risk of wildfire is elevated at these reserves as the episodic high rainfall events, which increase the fire risk by increasing annual plant growth, also coincide with a high rate of recreational use of the lake. The most recent wildfire was on 25 December 1993 when a campfire ignited dense Speargrass and carried the fire into a wooded area and over the gypseous dunes.

There is also a legal and moral obligation on CALM, as a land manager, to prevent fire originating on the reserves spreading to neighbouring assets. Assets include pastures, fences, and infrastructure, such as

homesteads or mine facilities. Additionally, there is the requirement to understand the effect that fire frequency has on habitats for both plants and animals. For these reserves there are no data on this aspect of management. Unlike elsewhere in the Goldfields, particularly where spinifex is an important component of the environment, there are no plans for prescribed burning. There is no peripheral or internal system of firebreaks on the reserves.

STRATEGIES

1. **Assess the fire risk to the reserves on a regular basis as part of the Goldfields Region Fire Control Working Plan annual review. (H)**

2. **Assess any site development for its risk to fire ignition. (H)**

3. **Prescribe measures to mitigate fire risks. (H)**

4. **Research and monitor fire behaviour and the ecological impacts of fire on the reserves. (H)**

5. **Provide information to reserve users on risks of wildfires and their impacts on the environment and of their legal obligations under the Bush Fires Act (per the interpretation plan – see Section 37). (H)**

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27. Weeds and Introduced Animals

The objective is to prevent the further introduction of declared plants and environmental weeds and feral animals and to reduce the risk of ingress of sheep and cattle, and to take control measures for those already present.

Weeds

A weed may be either a declared plant, under section 37 of the *Agriculture and Related Resources Protection Act 1972*, or it may be an environmental weed. In the case of a declared plant, the landholder, including CALM, has a legal responsibility to control it, due to its detrimental effect on primary production. An environmental weed is one that can have a detrimental effect on visitor safety, comfort, aesthetics or conservation of plant or animal communities. Policy Statement No. 14 'Weeds on CALM Managed Lands' defines a weed as 'any plant which is disadvantageous from the viewpoint of effective management for the land use concerned'. It may be either a native or introduced species.

The weeds on these reserves are not well documented, however, the declared plant Bathurst Burr (*Xanthium spinosum*) has been recorded. Environmental weeds including Saffron Thistle (*Carthamus lanatus*), Southern Liquorice (*Glycyrrhiza acanthocarpa*), Brom Grass (*Bromus rubens*), *Sonchus tennerimus* and *Solanum nigram* have also been recorded. Control programs for these weeds are ongoing. The surrounding pastoral leases are subject to quarantine restrictions for stock movement.

Introduced Animals

Introduced animals include feral (or unmanaged) and domestic (managed) species. Feral species occurring on the reserves include goats, rabbits, cats, foxes and bees, whilst domestic stock (sheep and cattle), are known to wander in from adjacent pastoral leases due to inadequate or flood damaged fencing. These reserves have the distinction of being the only ones in the Goldfields Region for which the number of introduced species of mammals exceeds the number of recorded species of native mammals.

As previously indicated there are, in part, habitat explanations for this but it is also true that feral cats and rabbits have been recorded in very high numbers. It is likely that they are having a detrimental effect on vegetation, habitat and both vertebrate and invertebrate fauna species. Rabbit control, to date, has been restricted to a rabbit poisoning, warren ripping and shooting programs, which has been moderately successful. Feral European bees have elsewhere been implicated in producing plant hybridity, usurping nesting hollows otherwise used by birds and having considerable nuisance costs to reserve users.

STRATEGIES

1. **Maintain the rabbit control program and monitor its efficacy. (H)**

2. **Maintain stock proof fences in co-operation with adjoining leaseholders to prevent sheep and cattle entering the reserves. (H)**

3. **In conjunction with proposed botanical work make an inventory of weeds on the reserves and implement control programs. (M)**

4. **Adopt machinery and raw material hygiene processes to minimise the risk of introduction and spread of weeds in the reserves. (H)**

5. **Assess the likely impact of any control program on non target plant and animal species. (H)**

6. **As baiting methods for feral cats become operational, investigate an integrated predator control program for the reserves and adjacent pastoral lands. (M)**

7. **Contribute to and participate in integrated feral goat control programs within the lake system catchment. (H)**

8. **Monitor the effects of feral bees on, for example, use of hollow spouts as bird nest sites. (L)**

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28. Mining

The objective is to manage and minimise the impacts of exploration and mining that modify or destroy habitats with particular emphasis on wetland systems and processes.

These reserves are located within a prospective area for minerals and there has been some exploration on the reserves. Mining can occur on lands managed for conservation under section 24 of the *Mining Act 1978*. However, the proposal in this plan to upgrade the reserves to 'A' class status will mean that exploration can only take place with the concurrence of the Minister for the Environment for the nature reserve, and recommendations from the Minister for the conservation park. Any ground disturbing activity may be referred to the Environmental Protection Authority (EPA) by the NPNCA, and with 'A' class status, production mining will require consent of both Houses of Parliament for the nature reserve as well as formal assessment by the EPA.

Mining may involve exploration and abstraction of groundwater for mineral processing. This is subject to the *Rights in Water and Irrigation Act 1979* and licensing by the Water and Rivers Commission (WRC). Groundwater here is saline to hypersaline, for example 100 000 TDS has been recorded at Carbine and North Carbine mining operations (D. Hamlyn, pers. comm.). There is anecdotal evidence (see Section 18 - Catchment and Hydrology) that the groundwater table lies not far beneath the lakes, therefore there is a requirement for utmost caution in any mine development proposal that may de-stabilise the present groundwater regime.

Basic raw materials including gravel, shale, sand, clay, limestone and other rocks are classified as minerals and are dealt with under provisions of the Mining Act. In addition to these statutory requirements any movement of basic raw material from or onto the reserves would require NPNCA approval.

STRATEGIES

1. **Mining and exploration on the reserves should proceed only after thorough environmental impact assessment due to their potential to impact on conservation and wetland values. (H)**

2. **Assess mining and exploration within the catchment for their potential to impact on hydrology and wetland processes. This is to include the impacts of groundwater abstraction. (H)**

29. Erosion and Rehabilitation

The objective is to identify erosion threats and sites where this has occurred, implement strategies to prevent further erosion and rehabilitate sites where it has occurred.

Erosion is a widespread phenomenon and serious environmental problem in arid lands managed for pastoral production. It can be exacerbated by intensive recreational use of localised sites, road and track construction, fire, water point establishment, domestic stock and feral grazing pressure.

Erosional processes are one of the forces that have shaped current landscapes. In situations of human-induced loss of vegetative cover or soil disturbance, the effects of fast moving water or wind can rapidly lead to serious degradation of large areas. The immediate effect is further loss of vegetation and topsoil and increased run-off as an accelerating cycle. Downstream effects could be siltation of sumplands, such as these lakes.

STRATEGIES

1. **Identify potential erosion hazards within the catchment and jointly manage with other land users. (L)**

2. **Identify, rehabilitate and monitor existing eroded areas within the reserves and their causes. (M)**

MANAGEMENT FOR RECREATION AND TOURISM

30. Overview

Recreation in lands that are perceived to be natural is a large and growing industry in Australia. There are several reasons for this, including a growing appreciation of the environment generally, improving access, a high rate of ownership of four wheel drive vehicles and increased leisure time for much of the population. In addition, there is growing interest overseas in Australia's unique flora, fauna and wide-open spaces. CALM has responded to this need by promoting passive recreational use of the lands under its management, subject to the constraints imposed by the requirement to maintain conservation values, visitor comfort and safety, as well as the cost of provision of services. These issues are dealt with in CALM's Policy Statement No. 18 'Recreation, Tourism and Visitor Services'. Central to this policy are two principles: that the recreational activity should not compromise the values of the site or reserve for which it was originally established, and that the recreational activity should be accompanied by relevant interpretative material, either provided on site or by publication.

Frequently there are conflicting views on appropriate recreational uses of lands managed by CALM. This occurs particularly when a recreational resource is in short supply and it can be used for very different purposes. This is exemplified by the issue of water skiing on high conservation value wetlands, such as Rowles Lagoon, and this issue is addressed below.

Tourism is a growth industry in Australia and is promoted vigorously by government at all levels, regional tourism associations, and local communities and by commercial operators. In recognition of the developing tourism interest in the natural environment, the term 'ecotourism' has been coined and there is a National Ecotourism Strategy. WA has a Nature Based Tourism Strategy. In view of the unusual opportunity to visit an arid zone wetland with visitor facilities relatively close to Kalgoorlie, there is great potential for the development of ecotourism ventures.

RECREATIONAL ACTIVITIES

31. Vehicle Access

The objective is to provide a satisfactory standard of dry weather, two-wheel drive access to camping and day use sites on Rowles Lagoon Conservation Park that does not compromise landscape values or create erosion hazards.

Access to the reserves is through Credo pastoral lease via 6 km of track from the main road (see Map 5). The Shire of Coolgardie and the Credo lessee maintains both the track and the road. Entry to the reserves is through a gate and internal access maintenance is the responsibility of CALM. Beyond the existing camping and Rowles Lagoon access, there are tracks that access other lakes and parts of Clear and Muddy Lakes nature reserve. Although these are not closed to the public they are principally access for management only, and are not maintained to a standard generally considered suitable for 2-wheel drive vehicles.

As all internal tracks are unsurfaced, in the event of exceptionally heavy rain it is necessary to close the reserves to vehicles for reasons of public safety and track stability. This situation will continue. Vehicle use of the reserves has been monitored since 1989. Traffic counters indicate that 821 vehicles visited Rowles Lagoon in 1996 and 882 vehicles between January and August in 1997. These figures exclude visits by CALM staff.

STATEGIES

1. **Continue to provide 2-wheel drive vehicle access to Rowles Lagoon in dry conditions and traffic control at the high use sites. (H)**

2. **Confine vehicle use to defined tracks and parking areas. (H)**

3. **Continue to monitor vehicle numbers entering the reserves. (M)**

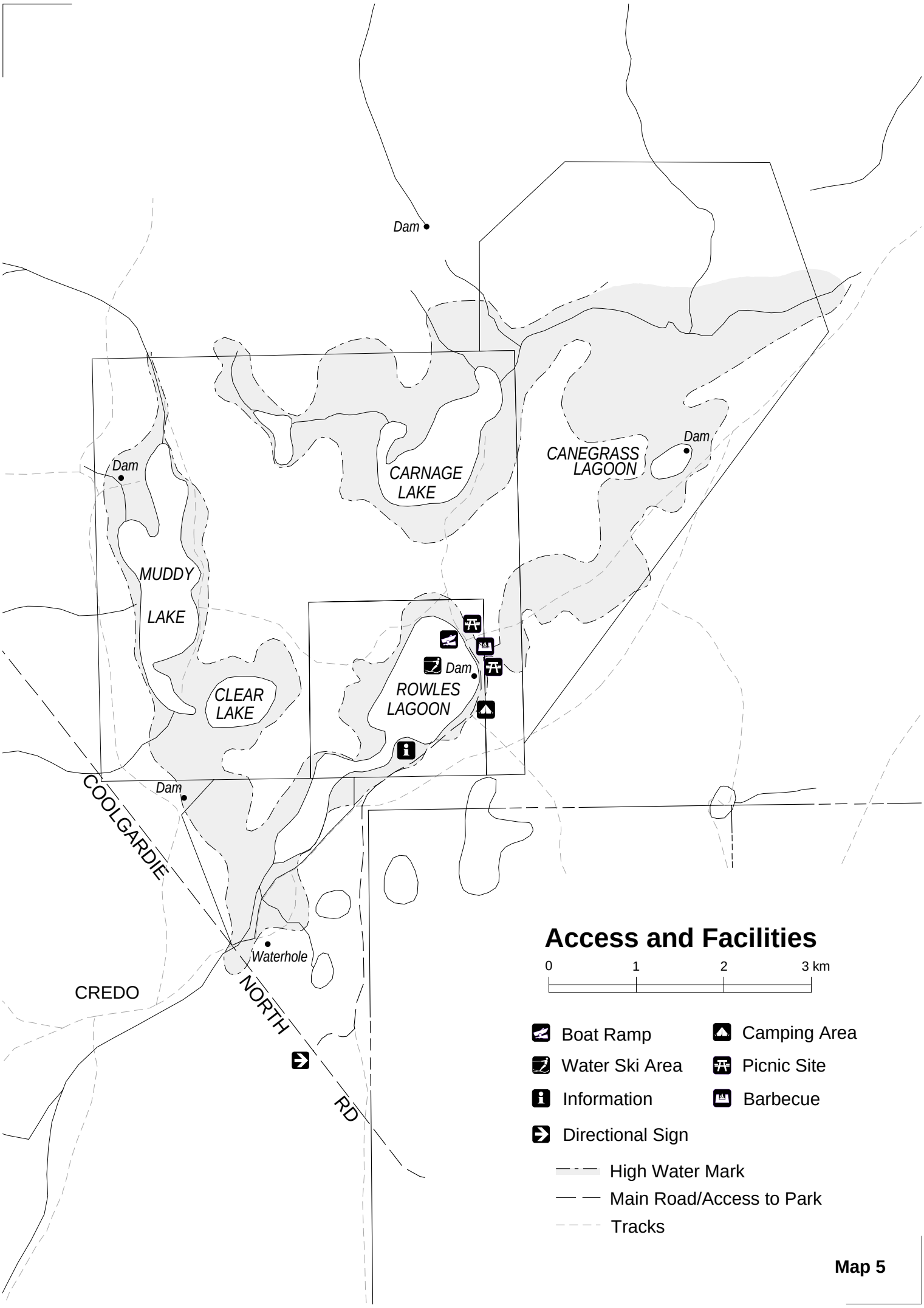
4. **Provide information to reserve users regarding impacts of off-road vehicle usage (per the interpretation plan – see Section 37). (M)**

---

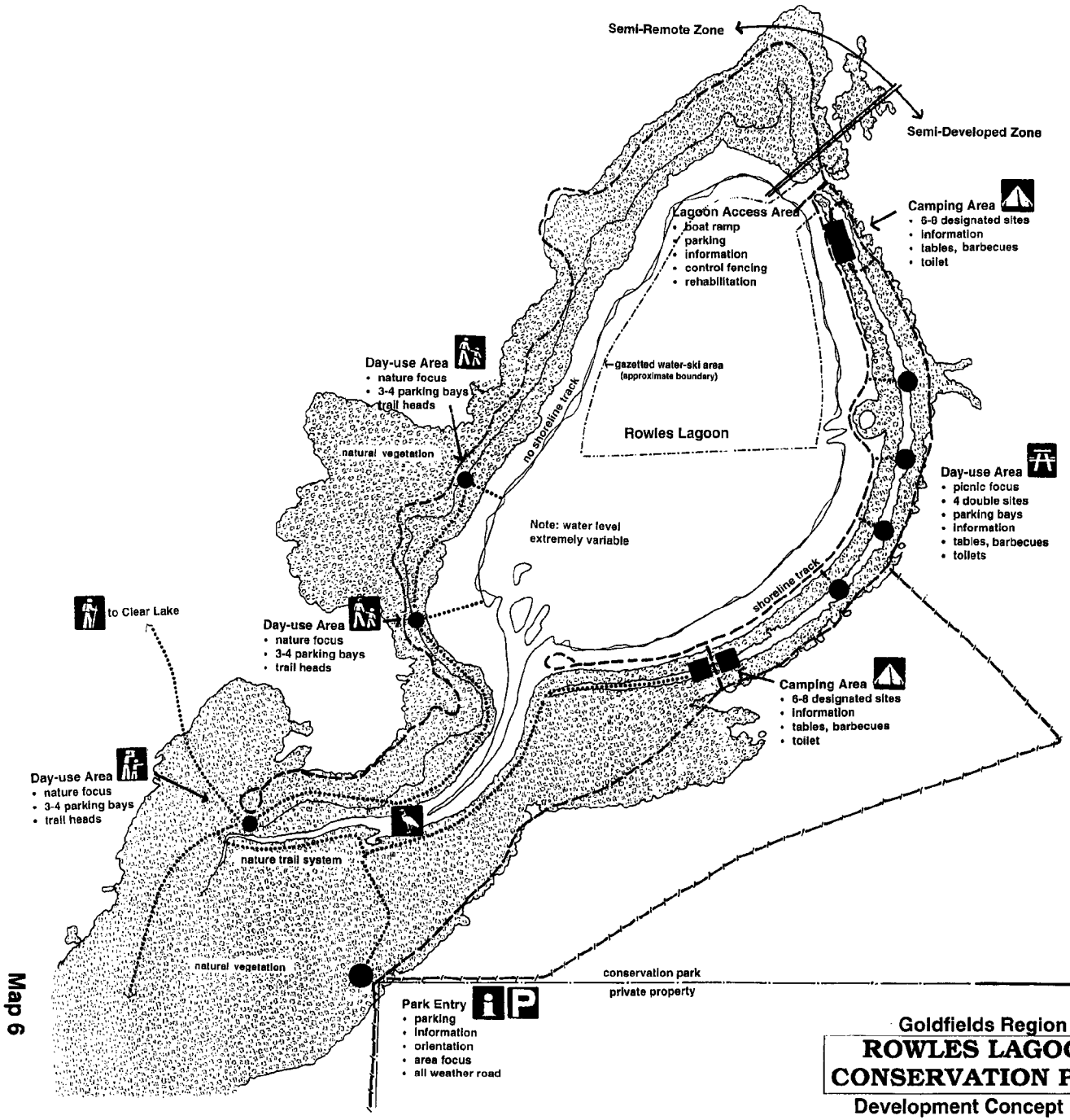
32. Camping and Day Use

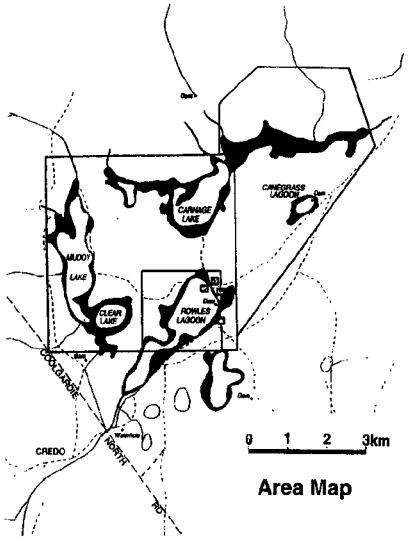
The objective is to zone Rowles Lagoon conservation park for camping and day use.

Camping is a permitted activity in conservation parks, but not in nature reserves. Day use (short visits usually involving a picnic/barbecue with provided facilities) is a permitted activity in conservation parks and in nature reserves. Visitor pressure within the reserves is high at Rowles Lagoon and its immediate surrounds and low elsewhere. Appropriate usage is compatible with the conservation values of the Lagoon. For these reasons, facilities will be provided at Rowles Lagoon but not at the other lakes. Proposed site development will be as indicated in the site plan (Map 6). There is no


Dam
CARNAGE LAKE
CANEGRASS LAGOON
Dam
Dam
MUDDY LAKE
CLEAR LAKE
ROWLES LAGOON
Dam
Dam
COOLGARDIE
Waterhole
CREDO
NORTH
RD
Access and Facilities
0
1
2
3 km
Boat Ramp
Camping Area
Water Ski Area
Picnic Site
Information
Barbecue
Directional Sign
High Water Mark
Main Road/Access to Park
Tracks

Map 5





Area Map

Legend

- Day use Area
- Camping Area
- Access tracks during low water levels
- Access track during wet weather and high water periods
- Walking trails

Map 6

Goldfields Region

ROWLES LAGOON CONSERVATION PARK

Development Concept Plan

0 100 200 300 400

north

Recreation Planning and Design Section

immediate intention to charge camping or entry fees, however, the cost of provision and maintenance of facilities will be closely monitored. The policy regarding the imposition of camping and/or entry fees could be reviewed within the life of this plan. Proceeds from any fees would be used to offset management costs.

STRATEGIES

1. **Develop separate sites for campers and day users with basic facilities and signpost them accordingly. (M)**

2. **Provide toilet facilities that are appropriately sited, designed and maintained. (H)**

3. **Provide wood for fuel for the established barbecues but discourage ground fires and provide information on the risk and dangers of wildfire (see also Section 26). (M)**

4. **Provide staff to oversee camping and day use and provide information to enhance visitors' stay at times of maximum use. (M)**

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33. Water-based Recreation

The objective is to facilitate water-based recreational activities that do not impact on wetland values or cause unacceptable conflict with other users.

The issue of recreational use of wetlands is often controversial in Australia. This is particularly so in arid, inland sites due to the limited number of wetlands that are suitable, the infrequency of their availability and the broad spectrum of potential uses. Some of these uses may be conflicting.

Rowles Lagoon has a tradition of use for power boating, usually involving water skiing, since at least the 1970s. It was only in 1994 that a water skiing area was gazetted and the activity became legal under the Navigable Waters Regulations.

At the time, a CALM assessment determined that the impact of powerboat use on waterbirds and on the shoreline was minimal. This was seen to be due to both the presence of other lakes (for use by the waterbirds) and a dense fringing thicket of vegetation which buffered the wash effect on the shore. However the assessment did predict that the high numbers of people and vehicles which the activity attracted would require considerable management inputs.

There has been considerable community concern expressed to CALM about the activity and its effect on other users, particularly on swimmers, and on people who liked the peace and quiet of the reserves and are disturbed by the excessive noise. Vandalism to markers and instances of inappropriate and hazardous behaviour in the past has also given rise to public safety concerns.

Management of power boating and water skiing is not undertaken by CALM, but by the Department of Transport (DoT) who have an office in Kalgoorlie-Boulder. Navigation markers have been recently re-established for the ski area and a depth marker will be re-installed in the near future.

At the pre-draft consultation meetings, there appeared to be strong support for degazettal of the ski area, in favour of provision of alternate areas. A number of alternatives were suggested within close proximity to Coolgardie and Kalgoorlie-Boulder. At the post-draft meeting, the converse of this view was strongly expressed, particularly by members of the community with an interest in this activity. Media coverage of the issue suggested that there are a number of people in the community who opposed the degazettal of the ski area.

Unlike skiing, power boating, windsurfing, sailing and canoeing do not require a gazetted area. These activities may continue, however, CALM will negotiate with DoT in relation to limiting powerboat speeds outside of the gazetted ski area.

Response to submissions:

The majority of the public submissions addressed this issue. CALM continues to have concerns over public safety,the appropriateness of this use and the impact of power boating on other visitors to the reserves. A number of management initiatives were suggested in submissions and have been included within the strategies adopted.

There was support in the submissions to restrict jet skis operating on the lakes. The Department of Transport have advised CALM that it is illegal to jet ski within the confines of the gazetted ski area. Outside of the ski area there are speed restrictions (8 knots) within shallow water and near the shore. For public safety reasons and in consideration to other visitors, CALM will negotiate with the Department of Transport to have the area outside of the gazetted ski area restricted to a speed limit of 8 knots.

As the only gazetted water ski area in the Kalgoorlie-Boulder area, there are also concerns that the demand for usage will exceed the carrying capacity of the lake, it's environs and associated facilities. CALM will support the community in defining and establishing alternative water ski sites within the region.

STRATEGIES

1. **Make a formal request that the Department of Transport develops an effective monitoring and**

regulation system for powerboating on Rowles Lagoon and, until an alternative area is established, allow for ongoing water skiing within the gazetted area. (H)

2. **Encourage and support the establishment of a powerboat user organisation and a community based self-monitoring and self-education system (code of conduct) for powerboating on Rowles Lagoon. (H)**

3. **In consultation with powerboating enthusiasts, the Department of Transport, visitors to the reserves and other stakeholders, develop a voluntary code of conduct for water based recreational activities on Rowles Lagoon. (H)**

4. **Provide advice and assistance to the community and Department of Transport on locating and developing an alternative water skiing site in the Kalgoorlie-Boulder area. (H)**

5. **Continue to provide for the use of powerboats on the lakes for management, research and search and rescue. (M)**

6. **Consult with the Department of Transport with the view to restricting powerboat speeds to 8 knots for the area outside of the gazetted ski area on Rowles Lagoon. (H)**

7. **Continue to provide for dinghy sailing, wind surfing and canoeing on Rowles Lagoon. (L)**

8. **Monitor the impact of water skiing and powerboating on the lakes and on other visitors and make any necessary changes to management, including phasing out of the activity, if environmental impacts, public safety risks or conflicts with other uses are found to be unacceptable. (H)**

9. **Review the compatibility of powerboating and water skiing with other uses in 2005 and initiate any necessary changes. (M)**

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34. Bushwalking, Bird-watching and Nature Appreciation

The objective is to provide for and encourage nature appreciation type activities on the reserves.

Passive recreational activities such as these are becoming increasingly popular. Given the conservation, recreational and aesthetic interest in wetlands, it is appropriate that these activities be provided for at these reserves. The unpredictability and infrequency of major inundation events, which determine levels of visitor usage, creates a challenge in determining the appropriate level of development. However, there are some initiatives that could be readily undertaken including establishment of a self-guiding walk track, display shelters with information on wetland values and a bird hide facility.

STRATEGIES

1. **Provide a self-guiding walk track network to interpret vegetation zonation, wetland and historical aspects of the reserves. (M)**

2. **Provide additional interpretative material, particularly on waterfowl use, by either standing display or written handout. (M)**

3. **Investigate funding options for provision of interpretative facilities and encourage community participation in facility planning. (M)**

4. **Investigate funding and design options for the development of bird hide facilities. (M)**

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35. Visitor Safety and Risk Management

The objective is to ensure that foreseeable risks to visitor safety are identified, the risk removed or mitigated where possible and the public warned of risks which are present.

As a fundamental legal obligation CALM has a 'duty of care' to users of lands under its management. CALM will actively promote the use of the area and provide facilities that minimise visitor risk and will provide information of possible risk.

STRATEGIES

1. **Conduct a safety audit of the camping and day use areas at Rowles Lagoon and the facilities provided and re-design, close or repair any risk situations as appropriate. (H)**

2. **Monitor situations of risk in the natural environment and provide appropriate warnings. (M)**

3. **Provide a 'duty of care' for swimming in Rowles Lagoon by designating safe areas and advising of known hazards. (M)**

36. Commercial Concessions, Tour Operators and Licensees

The objective is to provide for commercial concessions, which will enhance visitors' experience of the conservation park, which do not impact on its values or conflict with other users and will provide a financial return to CALM.

A concession is a commercial activity undertaken by a private individual or company on lands managed by CALM which provide a profit. Concessions must be consistent with the purpose of the reserve and be approved by the NPNCA and the Minister for the Environment. In the case of Rowles Lagoon, for example, an individual might wish to provide a waterfowl watching tour, or a community group may wish to use the lake and facilities for a special event and sell food or drinks. In either case, if approved, a licence or concession would be issued to the proponent and there would be a financial return to CALM. Note that commercial concessions are not possible on nature reserves.

STRATEGY

1. **Assess any existing or proposed commercial concessions for their impact on natural values, their consistency with purpose of vesting and effects on other users. (H)**

Other recreational activities that have occurred on the reserves (illegally) include horse riding, off-road driving of vehicles and trail bikes. Domestic animals, particularly dogs, have also been brought onto the reserves. These activities remain illegal under the CALM Act and Regulations unless they have been approved by CALM's Executive Director, or unless there is specific, approved zoning for these activities. An exception would be use of guide dogs for the blind or tracker dogs used in search and rescue. It is not CALM's intention to zone areas for these activities within these reserves.

COMMUNITY RELATIONS

The goal for community relations on all CALM managed lands and waters is based on the principle that CALM is managing natural areas for and on behalf of the people of Western Australia. For this to be successful, there needs to be clear procedures and a framework for two-way exchange between managers and users and/or with other interested parties.

37. Information, Interpretation and Education

The objective is to enhance visitors' experience by providing information that is relevant, up to date and well presented.

Presentation of information about natural areas is now as much a part of management as maintenance of facilities and access. It benefits users by enhancing their visit and making it a learning experience. It also benefits managers by having a better-informed public, generally more supportive of conservation and management of issues. At the same time it fosters appropriate behaviour so that adverse impacts are reduced.

The process for the provision of information has three components:

Information provides details of facilities, activities, hazards and regulations;
Interpretation explains themes of the natural or cultural environment which are present at the site; and
Education provides further detail by either display, written material, presentation of activity or program to enable learning and appreciation by a target group.

An interpretations plan is essential to develop appropriate information, interpretation and education materials for the reserves, to develop themes and to identify the media by which to provide this information. A number of topics to be covered in an interpretation plan have been identified throughout this plan including geology, landforms, soils, cultural heritage, wildfires, off-road vehicles, waterfowl, vegetation and wetland character. Other topics could include flora, fauna, land uses and landforms.

STRATEGIES

1. **Prepare an interpretation plan for the provision of information, interpretation and education to the visitors and the community. (H)**

2. **Seek external funding to establish a 'Ribbons of Blue' wetland study program for local schools. (L)**

3. **Provide further interpretative material on the wetland values, systems and processes. (M)**

4. **Provide staff presence at times of peak visitor activity. (H)**

5. **Prepare a visitor communications plan. (H)**

38. Community Involvement in Management

The objective is to provide a means of meaningful community involvement in management of the reserves

Community involvement in management can occur at a wide range of levels. Some examples include: informal contact with people with an interest in the reserves, involving people in volunteer activities, formation of a 'Friends of…' group, and formal arrangements through the establishment of a Management Advisory Committee or Group. These levels of involvement are complementary, rather than exclusive, because different people feel comfortable with different types of participation.

'Friends of' groups are usually established by like-minded people with a particular interest in a reserve or national park. The impetus to establish such a group is usually from outside of CALM although the Department will usually support it. A Management Advisory Group (MAG) may be established under the local CALM Regional Manager's authority. A MAG is ideally suited to deal with management situations in which CALM and neighbours have a common interest in sharing resources and facilities. A Management Advisory Committee (MAC) consists of members appointed by the Minister for the Environment, usually for the purpose of assisting with the development and implementation of a Management Plan.

STRATEGIES

1. **Continue to liaise with the Shire of Coolgardie and the City of Kalgoorlie-Boulder over management issues of the reserves. (H)**

2. **Encourage a 'Friends of Rowles Lagoon' group to enable community input into the planning for the provision of facilities and management of issues. (M)**

3. **Liaise with interest groups regarding the need to establish a Management Advisory Group (MAG). (L)**

4. **Hold a regular volunteers' event at the reserves and make further use of volunteers generally. (L)**

5. **Investigate jointly with local Aboriginal Groups Community Employment Development Program and other training provider agencies funding to undertake day to day care and maintenance on the reserves. (L)**

RESEARCH AND MONITORING

Research and monitoring are the processes by which knowledge of the reserves is increased and forms the scientific basis for management. Research within CALM is the responsibility of CALM*science*, but in locations such as these reserves there are increasing opportunities for regional staff and other institutions. Local tertiary institutions, other government agencies and specialist groups (e.g. Birds Australia), consultants and mining companies could be involved in research. This is, in part, due to the complexity of wetlands' structure and function and the wide array of disciplines required for understanding the processes.

39. Nature Conservation Research and Monitoring

The objective is to increase knowledge of the flora and fauna of the reserves and, in the case of the aquatic environment, the processes that enable waterfowl utilisation and breeding.

The priorities for nature conservation research on the reserves are to complete a botanical survey including an inventory of weed species, undertake baseline studies of the terrestrial and aquatic invertebrate fauna, and measure the effect of control of feral animals on the small ground-inhabiting vertebrate fauna. There is also a case to better understand the hydrological and ecological processes that sustain the wetland system, and the impacts of fire on the reserves.

STRATEGIES

1. **Complete botanical survey work on the reserves. (M)**
2. **Compile an inventory of weed species. (M)**
3. **Commence studies of aquatic invertebrate fauna with the next filling cycle. (L)**
4. **Monitor the small ground-inhabiting vertebrates in accordance with an integrated predator control program (see 27 - Weeds and Introduced Animals). (L)**
5. **Seek advice from the WRC regarding development of studies into hydrological processes for the wetland system. (L)**
6. **Develop and implement a program for studying the ecological processes of the wetland system. (M)**
7. **Develop a key indicator monitoring program for impacts and pressures on the reserve and wetland system. (H)**
8. **Research and monitor fire behaviour and the ecological impacts of fire on the reserves. (H)**

40. Social Research and Monitoring

The objectives are to seek a better understanding of visitor expectations of the reserves and to monitor the effect of recreational use and management practices on conservation and landscape values.

Management of natural areas for conservation and recreation requires that, not only the natural values are known and managed, but that the 'people' component is also understood. Why do people choose to spend their recreational time at one site in preference to others? What are their expectations when they arrive and what impressions do they take home with them? These are all relevant to management and the development and provision of appropriate facilities, as they indicate whether visitors' expectations are being met. To date the only visitor use data available are from a traffic counter installed in 1989. Managers also need to know the effects of visitor use and management itself on the resource that is managed.

STRATEGIES

1. **Continue to monitor vehicle entry and visitor use of the reserve by traffic counter and vistat surveys respectively. (M)**
2. **Conduct visitor use surveys to determine user profiles, preferences and use patterns. (M)**
3. **Commence photo point monitoring of day use and camp sites. (M)**

IMPLEMENTATION

41. Resources

The objective is to provide sufficient staff and funding to implement this plan.

The management plan for these reserves will, when finalised, make a number of commitments. These will need to be met within the life of the plan. These commitments have to be costed, budgeted and fitted into a works program. This is the responsibility of the Goldfields Regional office in Kalgoorlie, which receives an annual budget allocation. Some of the planning commitments may be able to be met from external funding or volunteer sources. For example, a volunteer, community or 'Friends of' group may be able to access funds which are not available to CALM to provide an interpretative display. Similarly, volunteers could be used for a visitor use survey and some Community Employment Development Funding for Aboriginal involvement in management has been recommended. Some research objectives may be able to be met by involving students and their supervisors from Curtin University of Technology, Kalgoorlie Campus, as well as expertise in other government agencies and the private sector.

STRATEGIES

1. **Budget for the implementation of this plan. (H)**

2. **Investigate external sources of funding and expertise to assist with implementation. (M)**

3. **Develop volunteer programs to assist in implementation. (L)**

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42. Priorities

The objective is to review annually the implementation of the plan according to priorities.

This plan makes many recommendations and outlines a number of strategies. Some of them are long-term and desirable outcomes, whilst others are quite specific actions requiring implementation in the short to medium term. An important part of planning is to allocate priorities and review them as circumstance change. This plan has allocated priorities against each strategy as HIGH (**H**), MEDIUM (**M**) or LOW (**L**), which are relevant at the time of writing, but these may change during the life of the plan. For example, if the wetlands were to remain dry for an extended period, visitor use would diminish and so would the requirement for resource allocation to maintain facilities.

STRATEGY

1. **Review priorities for strategies annually or as circumstances change. (H)**

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43. Evaluation and Review

Section 61 of the CALM Act provides for the plan to be amended, revoked or a new plan substituted if required. If major changes are proposed, the revised plan will be released for public comment.

The NPNCA is responsible for monitoring the implementation of this plan. To facilitate this, a local team of CALM officers will report regularly to the NPNCA. The term of the plan is 10 years.

STRATEGIES

1. **Review the implementation of this plan annually prior to the preparation of the works program for the following year. The review to identify which strategies have been achieved and what additional factors have or will influence implementation. (H)**

2. **Review the plan twice within 10 years from its gazettal, in consultation with the NPNCA, the reviews to include an audit of outcomes, reasons for lack of achievement and a summary of factors that may affect the subsequent plan, should it be required. (M)**

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ACRONYMS AND ABBREVIATIONS

ANCA	Australian Nature Conservation Agency (now Environment Australia)
CALM	Department of Conservation and Land Management
CAMBA	China Australia Migratory Birds Agreement
DEP	Department of Environmental Protection
DME	Department of Minerals and Energy
DoT	Department of Transport
EGHS	Eastern Goldfields Historical Society
EA	Environment Australia
EPA	Environmental Protection Authority
JAMBA	Japan Australia Migratory Birds Agreement
MAC	Management Advisory Committee
MAG	Management Advisory Group
NHT	Natural Heritage Trust
NPNCA	National Parks and Nature Conservation Authority
NWP	National Wetlands Program
TSS	Total Soluble Salts
WA	Western Australia
WRC	Water and Rivers Commission

APPENDICES

Appendix 1.
VERTEBRATE FAUNA RECORDED FROM ROWLES LAGOON CONSERVATION PARK AND CLEAR AND MUDDY LAKES NATURE RESERVE

BIRDS (B) indicates breeding record

Emu *Dromaius novaehollandiae* (B)
Blue-billed Duck *Oxyura australis*
Musk Duck *Biziura lobata* (B)
Freckled Duck *Stictonetta naevosa* (B)
Black Swan *Cygnus atratus* (B)
Australian Shelduck *Tadorna tadornoides* (B)
Australian Wood Duck *Chenonetta jubata* (B)
Pacific Black Duck *Anas superciliosus* (B)
Grey Teal *Anas gracilis* (B)
Pink-eared Duck *Malacorhynchus membranaceus* (B)
Hardhead *Aytha australis*
Australasian Grebe *Tachybabtus novaehollandiae* (B)
Hoary-headed Grebe *Poliocephalus poliocephalus* (B)
Great Crested Grebe *Podiceps cristatus*
Little Pied Cormorant *Phalacrocorax melanoleucos*
Little Black Cormorant *Phalacrocorax sulcirostris*
White-faced Heron *Egretta novaehollandiae* (B)
White-necked Heron *Egretta pacifica*
Glossy Ibis *Plegadis falcinellus*
Straw-necked Ibis *Threskiornis spinicollis*
Yellow-billed Spoonbill *Platalea flavipes*
Black-shouldered Kite *Elanus axillaris*
Whistling Kite *Haliastur sphenurus* (B)
Spotted Harrier *Circus assimilis*
Brown Goshawk *Accipiter fasciatus*
Collared Sparrowhawk *Accipiter cirrhocephalus*
Wedge-tailed Eagle *Aquila audax*
Little Eagle *Hieraaetus morphnoides*
Brown Falcon *Falco berigora*
Australian Hobby *Falco longipennis*
Peregrine Falcon *Falco peregrinus*
Nankeen Kestrel *Falco cenchroides*
Australian Spotted Crake *Porzana fluminea*
Black-tailed Native-hen *Gallinula ventralis*
Eurasian Coot *Fulica atra* (B)
Painted Button-quail *Turnix varia*
Black-tailed Godwit *Limosa limosa*
Common Greenshank *Tringa nebularia*
Common Sandpiper *Actitis hypoleucos*
Ruddy Turnstone *Arenaria interpres*
Red-necked Stint *Calidris ruficollis*
Pectoral Sandpiper *Calidris melanotos*
Sharp-tailed Sandpiper *Calidris acuminata*
Black-winged Stilt *Himantopus himantopus* (B)
Banded Stilt *Cladorhynchus leucocephalus*
Red-necked Avocet *Recurvirostra novaehollandiae*
Grey Plover *Pluvialis squatorola*
Red-capped Plover *Charadrius ruficapillus*
Black-fronted Dotterel *Elseyornis melanops*
Red-kneed Dotterel *Erythrogonys cinctus* (B)
Banded Lapwing *Vanellus tricolor*
Silver Gull *Larus novaehollandiae*
Whiskered Tern *Chlidonias hybridus*
Common Bronzewing *Phaps chalcoptera*
Crested Pigeon *Ocyphaps lophotes*
Galah *Cacatua roseicapilla*
Cockatiel *Nymphicus hollandicus*
Purple-crowned Lorikeet *Glossopsitta porphyrocephala*
Australian Ringneck *Barnardius zonarius*
Mulga Parrot *Psephotus varius*
Budgerigar *Melopsittacus undulatus*
Pallid Cuckoo *Cuculus pallidus*
Fan-tailed Cuckoo *Cacomantis flabelliformis*
Black-eared Cuckoo *Chrysococcyx osculans*
Horsefield's Bronze-cuckoo *Chrysococcyx basalis*
Southern Boobook *Ninox novaehollandiae*
Tawny Frogmouth *Podargus strigoides*
Spotted Nightjar *Eurostopodus argus*
Australian Owlet-nightjar *Aegotheles cristatus*
Red-backed Kingfisher *Todiramphus pyrrhopygia*
Rainbow Bee-eater *Merops ornatus*
White-browed Treecreeper *Climacteris affinis*
Rufous Treecreeper *Climacteris rufa*
Splendid Fairy-wren *Malurus splendens*
White-winged Fairy-wren *Malurus leucopterus*
Striated Pardalote *Pardalotus striatus* (B)
Weebill *Smicrornis brevirostris*
Western Gerygone *Gerygone fusca*
Inland Thornbill *Acanthiza apicalis*
Chestnut-rumped Thornbill *Acanthiza uropygialis*
Yellow-rumped Thorbill *Acanthiza chrysorrhoa*
Red Wattlebird *Anthochaera carunculata*
Spiny-cheeked Honeyeater *Acanthagenys rufogularis*
Yellow-throated Miner *Manorina flavigula* (B)
Singing Honeyeater *Lichenostomus virescens* (B)
White-eared Honeyeater *Lichenostomus leucotis*
Brown Honeyeater *Lichmera indistincta*
White-fronted Honeyeater *Phylidonyris albifrons*
Black Honeyeater *Certhionyx niger*
Crimson Chat *Epthianura tricolor*
White-fronted Chat *Epthianura albifrons*
Jacky Winter *Microeca fascinans* (B)
Red-capped Robin *Petroica goodenovii* (B)
Hooded Robin *Melanodryas cuccullata*
White-browed Babbler *Pomatstomus superciliosus* (B)
Varied Sitella *Daphoensitta chrysoptera* (B)
Crested Bellbird *Oreoica gutturalis*
Rufous Whistler *Pachycephala rufiventris*
Grey Shrike-thrush *Colluricincla harmonica*
Magpie-lark *Grallina cyanoleuca*
Grey Fantail *Rhipidura fuliginosa* (B)
Willie Wagtail *Rhipidura leucophrys* (B)
White-winged Triller *Lalage sueurii*

Community Relations

Masked Woodswallow *Artamus personatus*
Black-faced Woodswallow *Artamus cinereus*
Grey Butcherbird *Cracticus torquatus*
Pied Butcherbird *Cracticus nigrogularis*
Australian Magpie *Gymnorhina tibicen*
Grey Currawong *Strepera versicolor*
Australian Raven *Corvus coronoides*
Little Crow *Corvus bennetti*
Torresian Crow *Corvus orru*
Richard's Pipit *Anthus novaeseelandiae*
Zebra Finch *Taenopygia guttata*
Welcome Swallow *Hirundo neoxena* (B)
Tree Martin *Hirundo nigricans* (B)
Rufous Songlark *Cincloramphus mathewsi*
Brown Songlark *Cincloramphus cruralis*

MAMMALS

Western Grey Kangaroo *Macropus fuliginosus*
Red Kangaroo *Macropus rufus*
Euro *Macropus robustus*
Fat-tailed Dunnart *Sminthopsis crassicaudata*
Bolam's Mouse *Pseudomys bolami*
Sheep *Ovis aries*
Cow *Bos taurus*
European Fox *Vulpes vulpes*
Cat *Felis catus*
Rabbit *Oryctolagus cuniculus*
Goat *Capra hircus*
House Mouse *Mus musculus*

FROGS

Kunapalari Frog *Neobatrachus kunapalari*

REPTILES

Diplodactylus pulcher
Diplodactylus squarrosus
Gehyra variegata
Rynchoedura ornata
Underwoodisaurus milii
Ctenophorus cristatus
Tympanocryptis cephala
Ctenotus leonhardii
Cryptoblepharus plagiocephalus
Egernia inornata
Eremiascincus richardsonii
Lerista muelleri
Lerista picturata
Menetia greyi
Morethia adelaidensis
Morethia obscura
Tiliqua rugosa
Varanus gouldii
Ramphotyphlops bituberculatus
Pseudechis australis
Vermicella semifasciata

Appendix 2.
ROWLES LAGOON AND SURROUNDING LAKES - PRELIMINARY FLORA LIST

Annual and perennial shrub species recorded in the vicinity of the edges of the lakes.

Abutilon oxycarpum
Acacia nyssophylla
Actinobole uliginosum
Agrostis avenacea
Angianthus tomentosus
Aristida contorta
Atriplex codonocarpa
Atriplex nummularia
Avena fatua
Brachycome lineariloba
Bromus diandrus
Carrichtera annua
Carthamus lanatus
Centaurea melitensis
Centaurium spicatum
Centipidea sp.
Cratystylis subspinescens
Cuscuta australis
Dissocarpus paradoxa
Enchylaena tomentosa
Eragrostis dielsii
Eragrostis eriopoda
Eremophila maculata
Eremophila scoparia
Eriochiton sclerolaenoides
Exocarpos aphylla
Glycyrrhiza acanthocarpa
Goodenia pinatifida
Hordeum leporinum
Isolepis marginata
Lactuca serriola
Lawrencia squamatus
Leucochrysum fitzgibbonii
Lycium australe
Lythrium hyssopifolia
Maireana sedifolia
Marsilea sp.
Melaleuca uncinata
Muehlenbeckia cunninghamii
Olearia muelleri
Pentschistis airoides
Podolepis capillaris
Pogonolepis muelleriana
Polygonum plebeium
Pseudognaphalium luteo-album
Ptilotus exaltatus
Ptilotus holosericeus
Ptilotus obovatus
Rhagodia drummondii
Rhodanthe floribunda
Rumex pulcher subsp. *pulcher*
Scaevola spinescens
Sclerolaena obliquicuspis
Sida sp.
Sisymbrium orientale
Solanum hoplopetalum
Solanum nigrum
Solanum nummularium
Sonchus oleraceus
Stenopetalum pedicellare
Stipa ?trichophylla
Streptoglossus cylindriceps
Swainsona affinis
Templetonia sp.
Tetragonia eremaea
Thysanotus ?patersonii
Wahlenbergia sp.
Zygophyllum sp.