# Draft Peel-Yalgorup Ramsar Site Management Plan

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# Glossary

## After DEW (2007)

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| Administrative Authority | the agency within each Contracting Party charged by the national government with oversight of implementation of the Ramsar Convention within its territory [http://www.ramsar.org/about/about_glossary.htm]. |
| Adverse conditions | ecological conditions unusually hostile to the survival of plant or animal species, such as occur during severe weather like prolonged drought, flooding, cold, etc (Ramsar Convention 2005b). |
| Assessment | the identification of the status of, and threats to, wetlands as a basis for the collection of more specific information through monitoring activities (as defined by Ramsar Convention 2002a, Resolution VIII.6). |
| Baseline | condition at a starting point. For Ramsar wetlands it will usually be the time of listing of a Ramsar site (Lambert and Elix 2006). |
| Benchmark | a standard or point of reference (ANZECC and ARMCANZ 2000b).<br>a pre-determined state (based on the values which are sought to be protected) to be achieved or maintained (Lambert and Elix 2006). |
| Benefits | benefits/services are defined in accordance with the Millennium Ecosystem Assessment definition of ecosystem services as "the benefits that people receive from ecosystems (Ramsar Convention 2005a, Resolution IX.1 Annex A).<br>See also “Ecosystem Services”. |
| Biogeographic region | a scientifically rigorous determination of regions as established using biological and physical parameters such as climate, soil type, vegetation cover, etc (Ramsar Convention 2005b). |
| Biological diversity | the variability among living organisms from all sources including, *inter alia*, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within species (genetic diversity), between species (species diversity), of ecosystems (ecosystem diversity), and of ecological processes. This definition is largely based on the one contained in Article 2 of the Convention on Biological Diversity (Ramsar Convention 2005b). |
| Catchment | the total area draining into a river, reservoir, or other body of water (ANZECC and ARMCANZ 2000a). |
| Change in ecological character | is defined as the human-induced adverse alteration of any ecosystem component, process, and/or ecosystem benefit/service (Ramsar Convention 2005a, Resolution IX.1 Annex A). |
| Community | an assemblage of organisms characterised by a distinctive combination of species occupying a common environment and interacting with one another (ANZECC and ARMCANZ 2000a). |
| Community Composition | all the types of taxa present in a community (ANZECC and ARMCANZ 2000a). |
| Community Structure | all the types of taxa present in a community and their relative abundances (ANZECC and ARMCANZ 2000a). |

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| Conceptual model | wetland conceptual models express ideas about components and processes deemed important for wetland ecosystems (Manlet et al. 2000; Gross 2003) |
| Contracting Parties | are countries that are Member States to the Ramsar Convention on Wetlands; 153 as at September 2006. Membership in the Convention is open to all states that are members of the United Nations, one of the UN specialized agencies, or the International Atomic Energy Agency, or is a Party to the Statute of the International Court of Justice [http://www.ramsar.org/key_cp_e.htm]. |
| Critical stage | meaning stage of the life cycle of wetland-dependent species. Critical stages being those activities (breeding, migration stopovers, moulting etc.) which if interrupted or prevented from occurring may threaten long-term conservation of the species. (Ramsar Convention 2005b). |
| Ecological character | is the combination of the ecosystem components, processes and benefits/services that characterise the wetland at a given point in time. Within this context, ecosystem benefits are defined in accordance with the variety of benefits to people (Ecosystem Services). (Millennium definition of ecosystem services as "the benefits that people receive from ecosystems" (Ramsar Convention 2005a, Resolution IX.1 Annex A).<br><br>The phrase "at a given point in time" refers to Resolution VI.1 paragraph 2.1, which states that "It is essential that the ecological character of a site be described by the Contracting Party concerned **at the time of designation for the Ramsar List**, by completion of the Information Sheet on Ramsar Wetlands (as adopted by Recommendation IV. 7). |
| Ecological communities | any naturally occurring group of species inhabiting a common environment, interacting with each other especially through food relationships and relatively independent of other groups. Ecological communities may be of varying sizes, and larger ones may contain smaller ones (Ramsar Convention 2005b). |
| Ecosystems | the complex of living communities (including human communities) and non-living environment (Ecosystem Components) interacting (through Ecological Processes) as a functional unit which provides inter alia a variety of benefits to people (Ecosystem Services). (Millennium Ecosystem Assessment 2005). |
| Ecosystem components | include the physical, chemical and biological parts of a wetland (from large scale to very small scale, e.g. habitat, species and genes) (Millennium Ecosystem Assessment 2005). |
| Ecosystem processes | are the changes or reactions which occur naturally within wetland systems. They may be physical, chemical or biological. (Ramsar Convention 1996, Resolution VI.1 Annex A). They include all those processes that occur between organisms and within and between populations and communities, including interactions with the non-living environment, that result in existing ecosystems and bring about changes in ecosystems over time (Australian Heritage Commission 2002) |
| Ecosystem services | are the benefits that people receive or obtain from an ecosystem. The components of ecosystem services are provisioning (e.g. food & water), regulating (e.g. flood control), cultural (e.g. spiritual, recreational), and supporting (e.g nutrient cycling, ecological value). (Millennium Ecosystem Assessment 2005).<br><br>See also “Benefits”. |

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| Ecologically Sustainable Development | development that improves the total quality of life, both now and in the future, in a way that maintains the ecological processes on which life depends (ANZECC and ARMCANZ 2000a). |
| Fluvial geomorphology | the study of water-shaped landforms (Gordon *et al*. 1999) |
| Indicator species | species whose status provides information on the overall condition of the ecosystem and of other species in that ecosystem; taxa that are sensitive to environmental conditions and which can therefore be used to assess environmental quality (Ramsar Convention 2005b). |
| Indigenous species | a species that originates and occurs naturally in a particular country (Ramsar Convention 2005b). |
| Introduced (non-native) species | a species that does not originate or occur naturally in a particular country (Ramsar Convention 2005b). |
| Limits of Acceptable Change | the variation that is considered acceptable in a particular component or process of the ecological character of the wetland without indicating change in ecological character which may lead to a reduction or loss of the criteria for which the site was Ramsar listed' (modified from definition adopted by Phillips 2006). |
| List of Wetlands of International Importance ("the Ramsar List") | the list of wetlands which have been designated by the Ramsar Contracting Partiy in which they reside as internationally important, according to one or more of the criteria that have been adopted by the Conference of the Parties [http://www.ramsar.org/about/about_glossary.htm]. |
| Monitoring | the collection of specific information for management purposes in response to hypotheses derived from assessment activities, and the use of these monitoring results for implementing management (Ramsar Convention 2002a, Resolution VIII.6). |
| Ramsar | city in Iran, on the shores of the Caspian Sea, where the Convention on Wetlands was signed on 2 February 1971; thus the Convention's short title, "Ramsar Convention on Wetlands" [http://www.ramsar.org/about/about_glossary.htm]. |
| Ramsar Criteria | Criteria for Identifying Wetlands of International Importance, used by Contracting Parties and advisory bodies to identify wetlands as qualifying for the Ramsar List on the basis of representativeness or uniqueness or of biodiversity values. http://www.ramsar.org/about/about_glossary.htm |
| Ramsar Convention | *Convention on Wetlands of International Importance especially as Waterfowl Habitat*. Ramsar (Iran), 2 February 1971. UN Treaty Series No. 14583. As amended by the Paris Protocol, 3 December 1982, and Regina Amendments, 28 May 1987. The abbreviated names "Convention on Wetlands (Ramsar, Iran, 1971)" or "Ramsar Convention" are more commonly used [http://www.ramsar.org/index_very_key_docs.htm]. |
| Ramsar Information Sheet (RIS) | the form upon which Contracting Parties record relevant data on proposed Wetlands of International Importance for inclusion in the Ramsar Database; covers identifying details like geographical coordinates and surface area, criteria for inclusion in the Ramsar List and wetland types present, hydrological, ecological, and socioeconomic issues among others, ownership and jurisdictions, and conservation measures taken and needed (http://www.ramsar.org/about/about_glossary.htm). |

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| Ramsar List | the List of Wetlands of International Importance [http://www.ramsar.org/about/about_glossary.htm]. |
| Ramsar Sites | wetlands designated by the Contracting Parties for inclusion in the List of Wetlands of International Importance because they meet one or more of the Ramsar Criteria [http://www.ramsar.org/about/about_glossary.htm]. |
| Ramsar Sites Database | repository of ecological, biological, socio-economic, and political data and maps with boundaries on all Ramsar sites, maintained by Wetlands International in Wageningen, the Netherlands, under contract to the Convention [http://www.ramsar.org/about/about_glossary.htm]. |
| Wetlands | are 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 (Ramsar Convention 1987). |
| Wetland Assessment | the identification of the status of, and threats to, wetlands as a basis for the collection of more specific information through monitoring activities (Finlayson *et al*. 2001; Ramsar Convention 2002a). |
| Wetland Ecological Risk Assessment | a quantitative or qualitative evaluation of the actual or potential adverse effects of stressors on a wetland ecosystem (US EPA 1989) |
| Wetland types | as defined by the Ramsar Convention's wetland classification system [http://www.ramsar.org/ris/key_ris.htm#type]. |
| Wise use of wetlands | is the maintenance of their ecological character, achieved through the implementation of ecosystem approaches[1], within the context of sustainable development[2]" (Ramsar Convention 2005a Resolution IX.1 Annex A).<br><br>1. Including *inter alia* the Convention on Biological Diversity's "Ecosystem Approach" (CBD COP5 Decision V/6) and that applied by HELCOM and OSPAR (Declaration of the First Joint Ministerial Meeting of the Helsinki and OSPAR Commissions, Bremen, 25-26 June 2003).<br><br>2. The phrase "in the context of sustainable development" is intended to recognize that whilst some wetland development is inevitable and that many developments have important benefits to society, developments can be facilitated in sustainable ways by approaches elaborated under the Convention, and it is not appropriate to imply that 'development' is an objective for every wetland. |

# Contents



# List of figures

# List of tables

# Introduction

## Site description

The Peel-Yalgorup System was designated a "Ramsar Site" when it was added to the Ramsar Convention's list of internationally important wetlands in 1990, in recognition of the biodiversity values of the wetlands in the System.

Located approximately 80 km south of Perth, the Peel-Yalgorup System comprises the Peel Inlet and Harvey Estuary (estuarine), wetlands of Lakes McLarty and Mealup (freshwater), the Yalgorup National Park environment (saline lakes) and sections of fringing upland (Figure 1). The Peel-Yalgorup System stretches over 60 km from north to south and approximately 10 km east to west.

The wetlands of the Peel-Yalgorup System are considered to be representative examples of wetlands on the Swan Coastal Plain. They form a chain of diverse habitats, which in turn support an array of ecologically important species and communities (DEC, 2002). Each wetland 'sub-system' (the estuary, freshwater wetlands and saline lakes) independently qualifies as 'internationally important' (Hale and Butcher, 2007). However, the wetlands were together nominated as the 'Peel-Yalgorup System' (hereafter the System) under the International Convention on Wetlands (or Ramsar Convention) in recognition of their combined values as a diverse wetland system.

The 26,530 ha System forms part of the Swan Coastal Plain Bioregion, located in the southwest of Western Australia (Figure 2). The Swan Coastal Plain Bioregion is one of Conservation International's 34 biodiversity hotpots, representing one of 'the richest and most threatened reservoirs of plant and animal life on earth'.

Despite such accolades, more than 80% of wetlands on the Swan Coastal Plain (the low-lying portion of the bioregion) have been lost to clearing and infilling, with much of the remaining wetland area heavily modified (Balla, 1994). Of the wetlands that remain, only 15% are considered as having high conservation values. These are designated 'Conservation Category wetlands' (WRC, 2001) and include the wetlands that comprise the Peel-Yalgorup System.

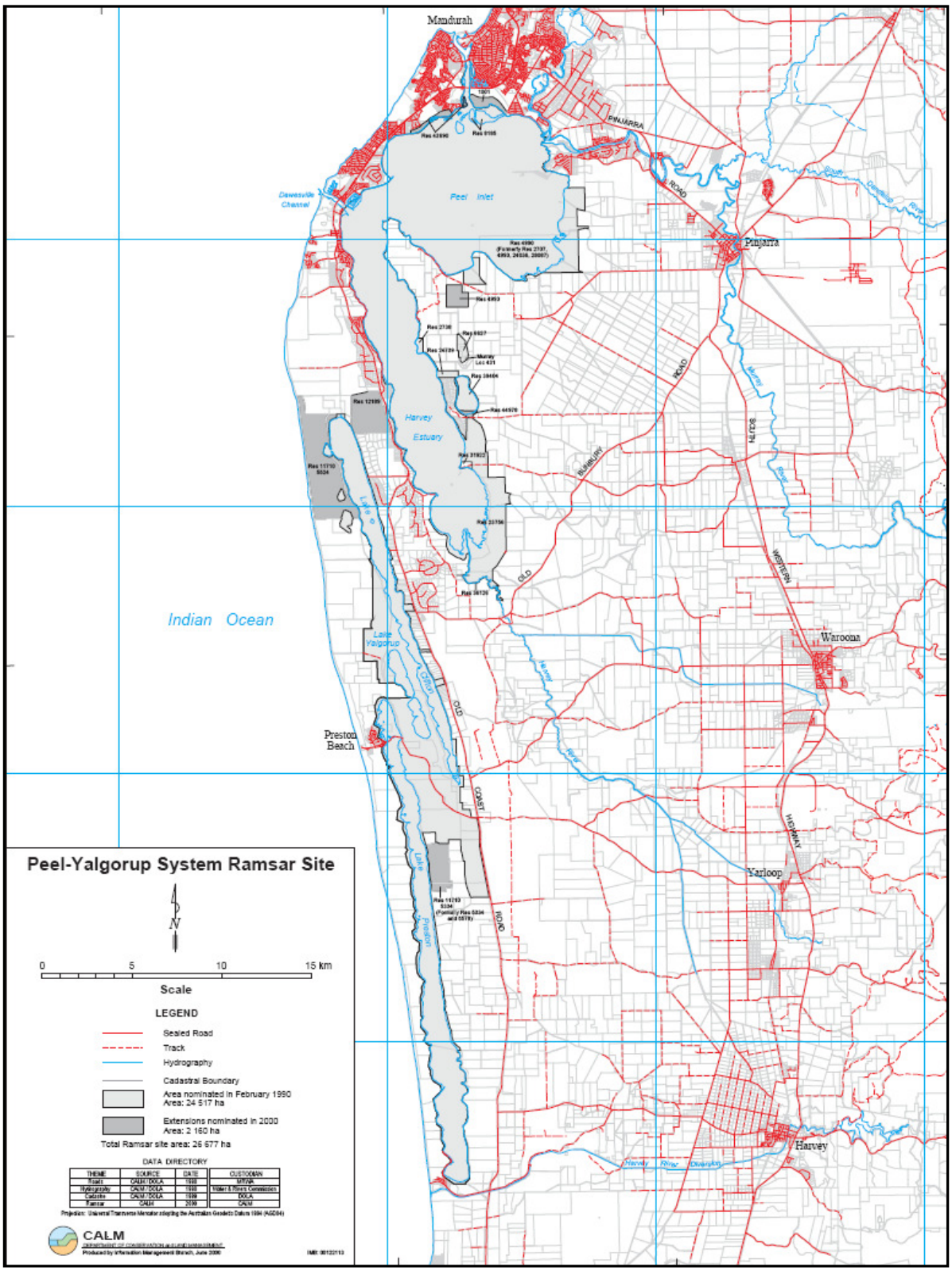


Figure 1: Current boundary map of the Peel-Yalgorup Ramsar Site

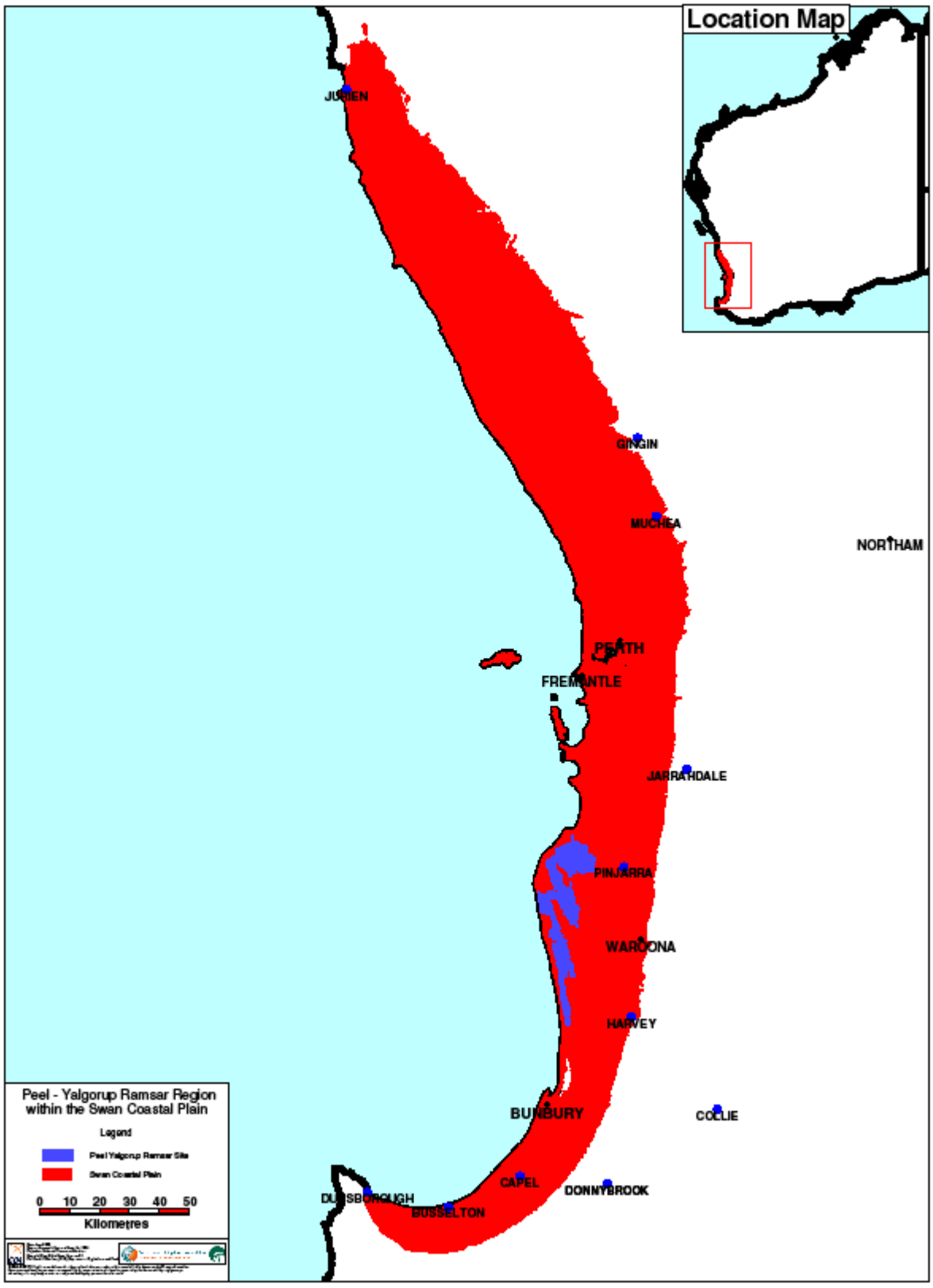


Figure 2: Location of the Peel-Yalgorup System and the Swan Coastal Plain Bioregion

## Area covered by the plan

The Peel-Yalgorup System was originally listed under the Ramsar Convention in 1990, but was extended in 2001 to include an additional eight small sections of wetland and fringing upland that were deemed to support the internationally-important values of the System, bringing the total area of the Ramsar site to 26,530 ha.

The Department of Environment and Conservation and the Peel-Harvey Catchment Council, together with the relevant local government authorities, are proposing to again revise the boundary. The revisions aim to align the Ramsar site with land reserved as Regional Open Space (under the Peel Region Scheme) and which are already reserved public lands managed for nature conservation or other compatible land uses. The areas for extension will also support the ecological or cultural values of the System.

The Australian Government requires that an ecological character description and management plan accompany new nominations and extensions to Ramsar wetlands. For this reason, Goegrup and Black Lakes have been included with the existing Ramsar site as the area covered by this plan (Figure 3).

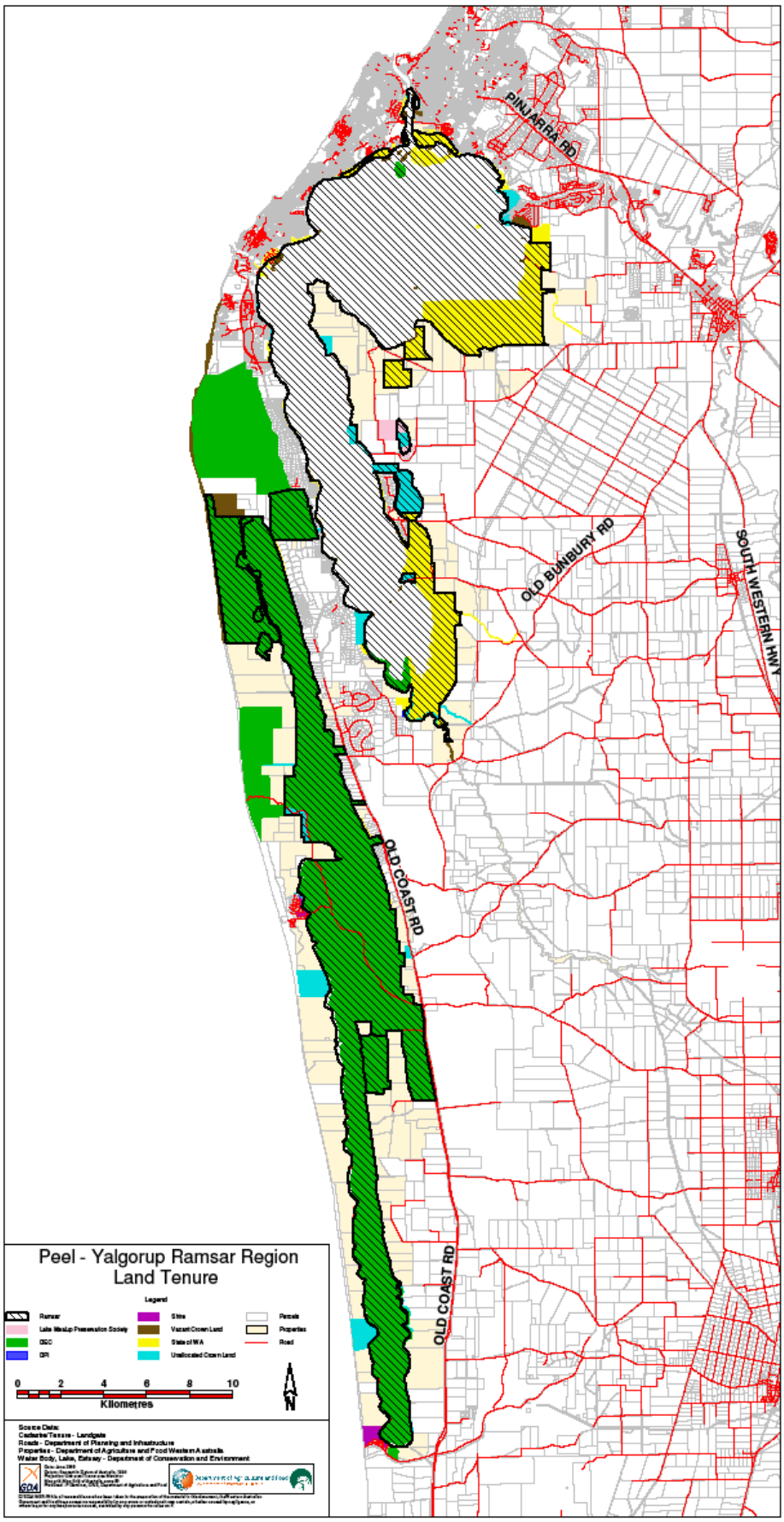


Figure 3: Area covered by this plan

This Plan complements a number of additional documents prepared in support of the Australian Government's commitments to wetland wise use and the Ramsar Convention:

- *Ecological Character Description for the Peel-Yalgorup System* (ECD) (Hale and Butcher 2007)
- Peel-Yalgorup Ramsar Site Monitoring Plan (Hale 2008) – Appendix A
- Draft Ramsar Information Sheet – Appendix D

## Stakeholders

A diverse range of stakeholders influence, or are affected by the way in which the wetlands in the System are managed (Table 1). Stakeholder groups include: Primary stakeholders, indigenous custodians, local governments, state government agencies and individual community members, local interest groups and community based organisations.

Each of the organisations identified as primary stakeholders were asked to outline their roles on responsibilities in the management of the Peel-Yalgorup Ramsar Site, in an effort to define how the different groups complement one another in landscape scale management. Table 2 includes a summary of responses.

Table 1: Ramsar site management stakeholders

| Stakeholder group | Description | Comprises of… |
|---|---|---|
| Primary stakeholders | Agencies and organisations with direct management responsibilities for the ecological character of the Peel-Yalgorup System | Western Australian Conservation Commission<br>Dept. of Environment and Conservation<br>Dept. of Environment Water Heritage and the Arts (Australian Government)<br>Dept. of Water<br>Lake Mealup Preservation Society<br>Dept. of Fisheries<br>Western Australian Planning Commission<br>Dept. for Planning and Infrastructure (Marine)<br>Dept. for Planning and Infrastructure (Peel and Bunbury Regional Planning) (WA)<br>Peel Development Commission |
| Indigenous custodians | Organisations with direct management roles | Bilya Indigenous Organisation<br>Winjan Aboriginal Corporation |
| Local governments | Organisations that directly influence the management of the System and which manage reserved lands within or adjacent to the Ramsar site | City of Mandurah<br>Shire of Murray<br>Shire of Waroona<br>Shire of Harvey |

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| State government stakeholders | Agencies with duties that may either affect the ecological heath of the Ramsar site or whose core business may be affected by changes in the way the System is managed | Dept. of Environment and Conservation<br>Dept. of Water (aquatic science)<br>Dept. of Agriculture and Food<br>Environmental Protection Agency<br>Tourism WA<br>Dept of Sport and Recreation |
| Locally based advocacy groups | Local organisations with members who actively participate in conservation or management of the wetlands | Peel Preservation Group<br>FRAGYLE (Friends of Ramsar Action Group for the Yalgorup Lakes Environment)<br>Lake Mealup Preservation Society<br>Mandurah Bird Observers<br>Canoe Trail Friends of Mandurah and Pinjarra<br>Friends of Rivers Peel<br>Birds Australia Western Australia<br>Western Australian Naturalists Club |
| Broader advocacy groups | Organisations with an interest in the conservation and management of natural resources and the environment, including the System | Conservation Council WA<br>Greening Australia<br>WWF |
| Catchment and coastal zone management stakeholders | Local governments | Shire of Serpentine-Jarrahdale<br>Shire of Boddington<br>Shire of Cockburn<br>Shire of Kwinana<br>Shire of Cuballing<br>Shire of Wandering<br>Shire of Williams |
| | Community groups | Peel-Harvey Catchment Council<br>South West Catchments Council<br>City of Mandurah Coastcare groups<br>Landcare District Committees<br>Waroona Landcare Centre<br>Serpentine Jarrahdale Landcare Centre<br>Hotham Catchment Landcare<br>Narrogin-Williams Landcare<br>Waterside Residents Association<br>City of Mandurah Bushcare<br>Southern Estuary Progress Association<br>Lake Preston Sporting and Progress Association<br>Corio Landcare Group |

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|---|---|
| Business and industry | Includes tourism, housing and development, mining, commerce and agriculture/silviculture |

Table 2: Roles and responsibilities of primary stakeholders and local governments

| Stakeholder group | Description | Comprises of… |
|---|---|---|
| Primary stakeholders | Agencies and organisations with direct management responsibilities for the ecological character of the Peel-Yalgorup System | Conservation Commission<br>Dept. of Environment and Conservation<br>Dept. of Environment Water Heritage and the Arts (Australian Government)<br>Dept. of Water<br>Lake Mealup Preservation Society<br>Dept. of Fisheries<br>Western Australian Planning Commission<br>Dept. for Planning and Infrastructure (Marine)<br>Dept. for Planning and Infrastructure (Peel and Bunbury Regional Planning) (WA)<br>Peel Development Commission |



*Wetland managers*

Land tenure within the Peel-Yalgorup System is complex (Figure 4). Four state government agencies have management responsibility for various sections of the System: the Department of Water, Department of Environment and Conservation, the Western Australian Planning Commission and the Department for Planning and Infrastructure.

Under the *Waterways Conservation Act 1976*, the **Department of Water** (DOW) is vested with responsibility for managing the Peel Inlet Management Area, included in which is the estuarine and freshwater sections of the Ramsar Site. Its powers and functions include:

- Preparation and review of management programs
- Pollution control
- Provide schemes directed at the abatement, control and prevention of litter and other forms of pollution
- Arrange and establish public infrastructure facilities in cooperation with state and local agencies
- The assessment and issue of approvals and licences for a broad range of activities in the waterways (such as dredging, reclamation, disposal of matter, retaining walls)
- Provision of advice on regional and strategic planning and development processes

- The Department must also have regard to the terms of any relevant management program for the area in making its recommendations and in generally exercising its powers (WRC 2002)

The Department of Water's functions and powers closely align with the operations of other land and water management agencies. For example, DOW has statutory management responsibilities for Lake McLarty (as part of the declared Peel Inlet Management Area), yet management functions are largely overseen by DEC. Also, Western Australian water resources legislation is currently undergoing review which may result in changes to the power and functions of DOW in managing the wetlands in the Peel Inlet Management Area. In the time since the *Waterways Conservation Act 1976* was enacted, many of the powers and functions of the Department have been superseded by other complementary legislation. For example, the *Environmental Protection Act 1985* includes provisions for pollution control, and which falls under the jurisdiction of the Department of Environment and Conservation.

DOW also oversees the Peel Inlet Management Council (PIMC). The Council's main focus is on the Peel Inlet Management Area (Figure 5), although it plays a broader role in promoting the values and benefits of waterways and wetlands; working in partnership with stakeholders in the community; and, supporting effective and efficient management of natural resources in the Peel Harvey catchment. The Council is an advisory committee established under the *Water Agencies (Powers) Act 1984* and reports to the Department of Water and ultimately is an advisory committee of the Minister for Water Resources.

Under the *Conservation and Land Management Act 1984* the **Department of Environment and Conservation** (DEC) is charged with the responsibility of preparing management plans for reserves vested with the Conservation Commission. This includes the wetland environment of Yalgorup National Park, the Kooljerrenup Reserve adjacent to the Estuary, Lake McLarty Nature Reserve (including Lake Mealup) and Boundary Island.

DEC also have a shared responsibility for managing Western Australia's Ramsar sites. Under a bilateral agreement with the Australian Government, DEC assumed the responsibility for managing the State's Ramsar wetlands and implements management programs where NHT funds are available.

The **Western Australian Planning Commission** is the authority responsible for strategic land use planning in Western Australia. In this respect, the WAPC has prepared the following strategic plans for the for the regions that encompass the Ramsar site :

- Inner Peel Region Structure Plan, 1997; and
- Coastal and Lakelands Planning Strategy, 1997.

Among other things, these propose the protection of extensive areas within statutory reservations, including the whole Ramsar site and proposed extensions. The WAPC is also the authority responsible for the Peel Region Scheme and Greater Bunbury Region Scheme. Under these statutory planning schemes, the Ramsar site and proposed extensions are protected by the Regional Open Space (Figure 6) and Waterways reservations. The purpose of the ROS reservation is to protect the natural environment, provide recreational opportunities, safeguard important landscapes and provide for public access. The WAPC

has controlled the use and development of the reserved areas for this purpose since the PRS and GBRS came into effect, in 2003 and 2007 respectively. Also, the WAPC is progressively acquiring all private land (and waterways) within these reservations for direct protection through the schemes and manages such land pending its transfer to a permanent managing authority.

The **Department for Planning and Infrastructure** serves the WAPC in relation to the above regional planning and land acquisition functions. It also manages unallocated Crown land within the area. Additionally, the DPI (Marine Division) has responsibilities in relation to infrastructure management, including boating facilities, moorings and jetties. It also controls subdivision on adjoining private land.

The Peel-Harvey Catchment Council plays a facilitating and coordinating role in natural resource management within the Peel-Harvey. The Catchment Council is an incorporated body comprising members of the community, as well as representatives of State and Local Government agencies.

In addition, the Lake Mealup Preservation Society has freehold land which is managed for the purpose of conservation. The whole of Lake Mealup Preservation Society's 123.686ha property is protected as covenanted bushland (through The National Trust) and is managed according to the *Management Plan for Covenanted Bushland at Lake Mealup, Pinjarra*.

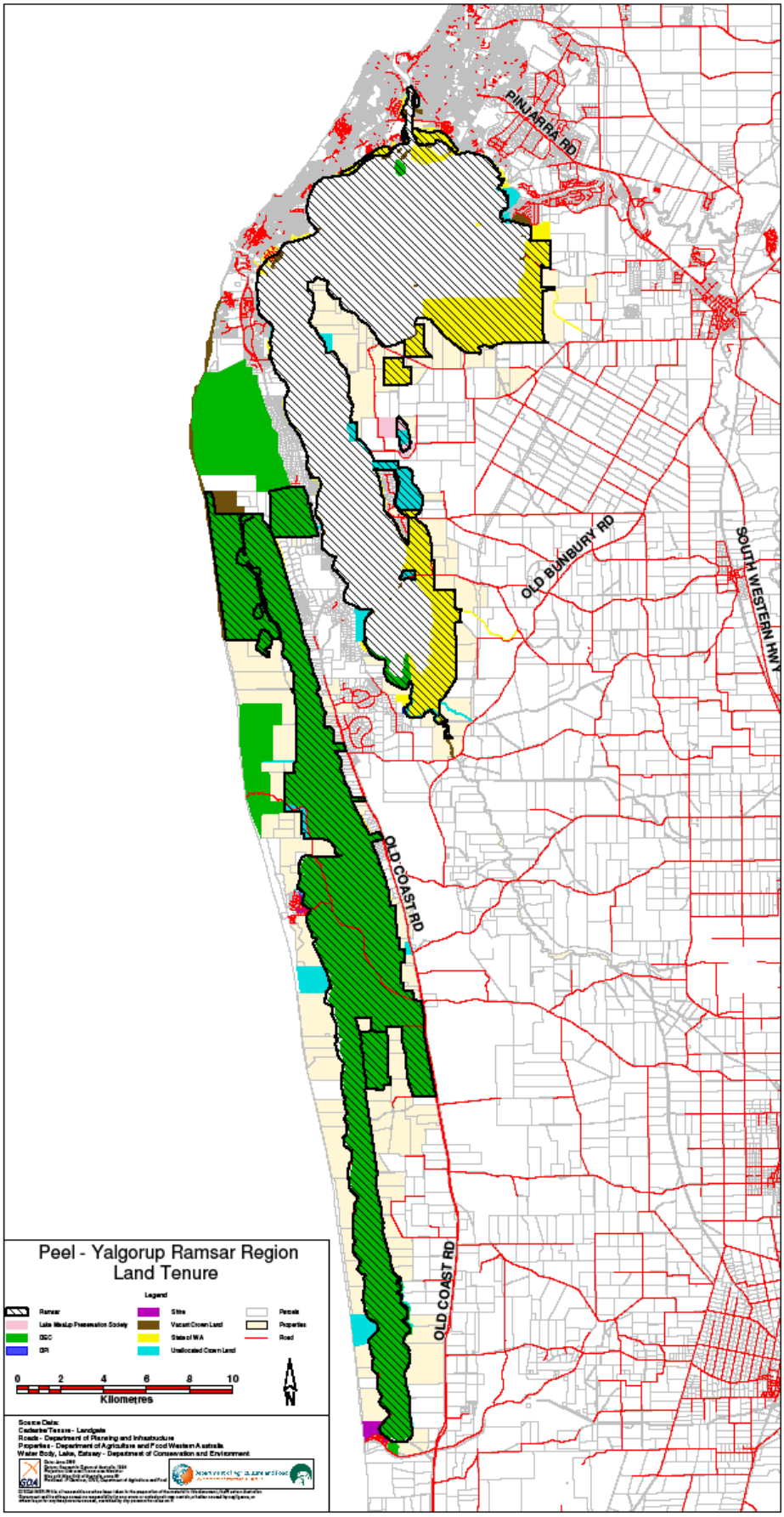


Figure 4: Land tenure

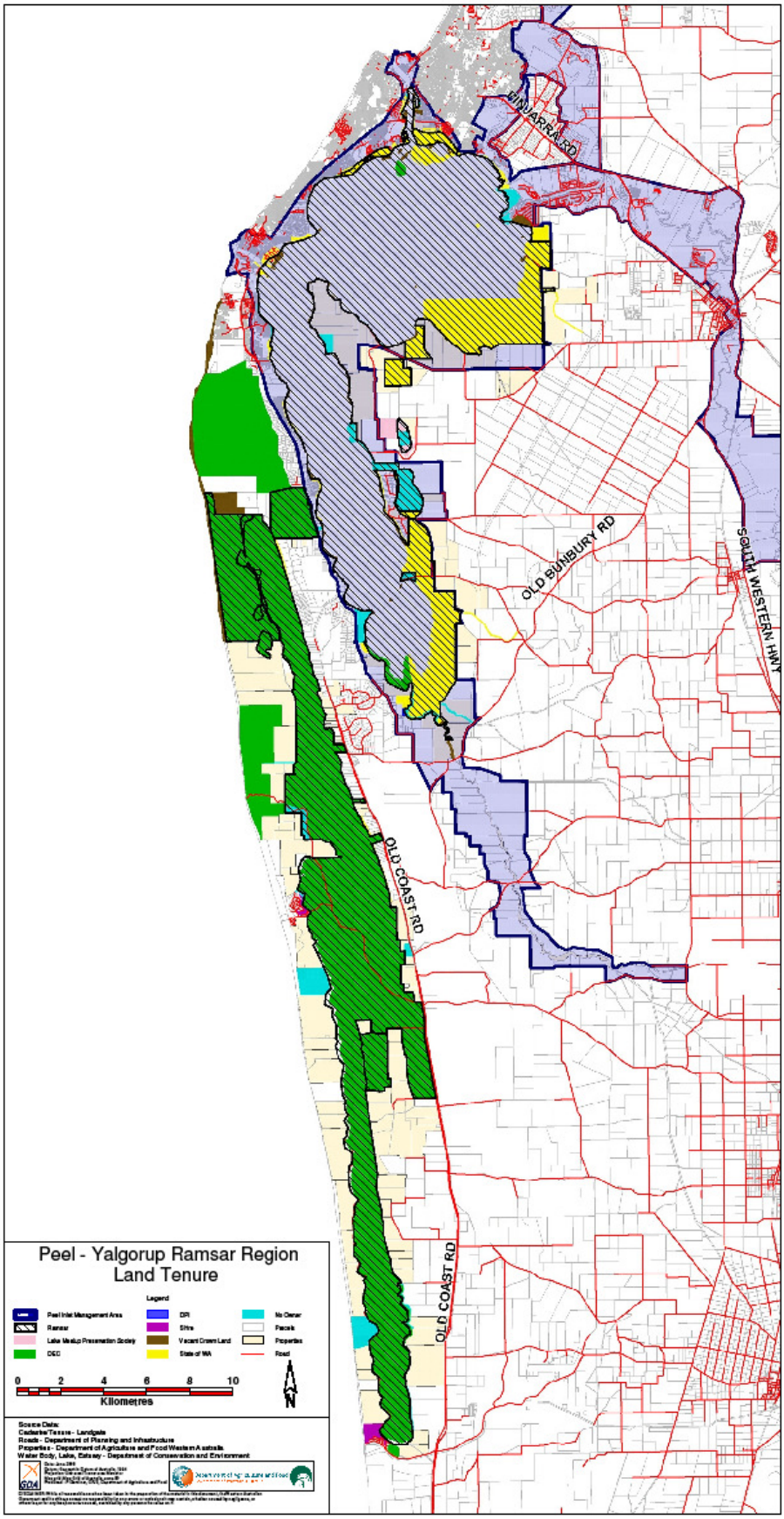


Figure 5: Peel Inlet Management Area


Figure 6: Peel Region Scheme, Regional Open Space

*Local governments*

The Peel-Yalgorup System falls within four local government areas: The City of Mandurah and the Shires of Murray, Waroona and Harvey. All four local authorities have management responsibilities for conservation and recreation reserves inside, or adjacent to, the Ramsar site (Figure 7).

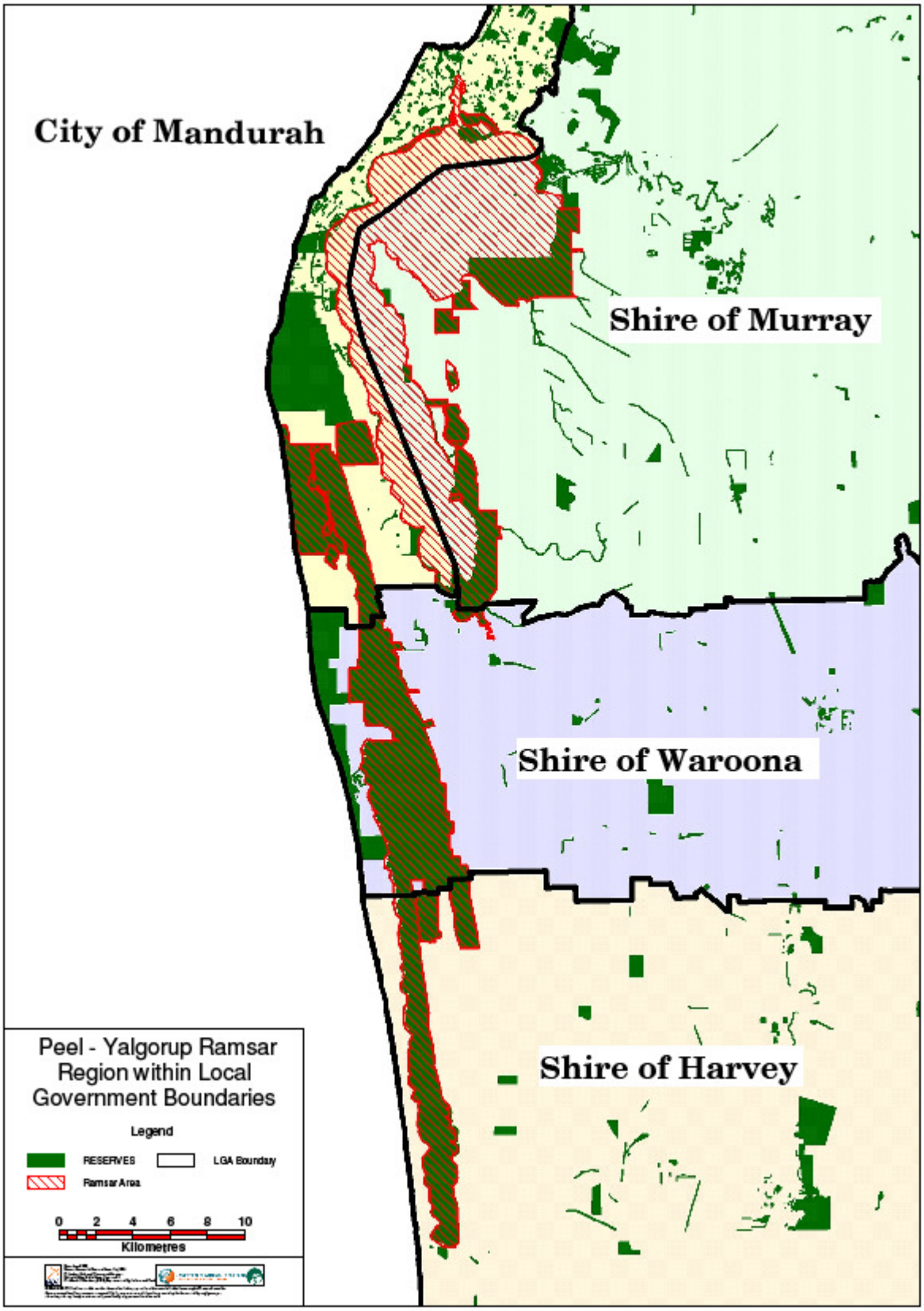


Figure 7: Local Government Areas

*Community and collaborative management*

As a signatory to the Ramsar Convention, the Australian Government accepts responsibility for the wise use of Australia's important wetlands. A bilateral agreement between the Federal and State Governments was developed to deliver the first stage of the Natural Heritage Trust (NHT) in which management responsibilities were agreed to become a joint responsibility with the State, with financial support from the Australian Government. The Western Australian Department of Environment and Conservation assumed the responsibility for managing the State's Ramsar wetlands and implements management programs where NHT funds are available.

In reviewing management of the State's Ramsar wetlands, the Auditor General (2006) commented that the Department of Environment and Conservation (DEC), as the lead agency for Ramsar sites in Western Australia, does not have authority to manage sites where they are not wholly vested with the Conservation Commission. The Peel-Yalgorup System is unique in that it is the only Ramsar site in Western Australia for which land management responsibilities are shared between multiple state agencies (including DEC) and private landholders. Therefore, collaborative management of the Peel-Yalgorup System is crucial to ensuring wise use of the wetlands in the System. A collaborative planning process, underpinned by a stakeholder based technical advisory group was established the first step in the planning process. Ongoing collaborative management will be crucial to implementing this management plan.



## Planning process

*Our international commitments*

The International Convention on Wetlands was signed in the town of Ramsar, Iran, in 1971. Its mission is "the conservation and **wise use** of all wetlands through local, regional and national actions and international cooperation, as a contribution towards achieving sustainable development throughout the world" (Ramsar 2008).

Under Article 3.1 of the Ramsar Convention, Contracting Parties, such as Australia, agree to *"formulate and implement their planning so as to promote the conservation of Ramsar-listed wetlands and as far as possible the wise use of wetlands in their territory".* This is an obligation for the Australian government, as well as a responsibility of stakeholders in the management of the wetlands.

Contracting parties also commit to:

- work towards the **wise use of all their wetlands** through national land-use planning, appropriate policies and legislation, management actions, and public education;
- designate suitable wetlands for the **List of Wetlands of International Importance** ("Ramsar List") and ensure their effective management; and
- **cooperate internationally** concerning trans-boundary wetlands, shared wetland systems, shared species, and development projects that may affect wetlands (Ramsar, 2008).

Other international commitments also guide the way in which the wetlands should be managed. The Australian Government is a signatory to bilateral agreements with China (CAMBA) Japan (JAMBA) and Korea (ROKAMBA). These agreements provide a framework for international collaboration in protecting habitats for migratory birds within the East Asian-Australasian Flyway.

*Peel-Yalgorup planning process*

A step-wise approach for the development of this management plan was established through guidance from the Ramsar Convention and from examples and case studies of other Australian Ramsar sites. The key features of the approach include:

- *Implementing a participatory and collaborative management approach*, through a process of stakeholder mapping, establishing partnerships with State government agencies; creating a Technical Advisory Group featuring representatives of key stakeholder agencies and organisations; broader community engagement through workshops, public lectures and presentations along with other awareness raising actions
- *Reviewing existing information about the ecological features* of the system (presented in the Ecological Character Description for the Peel-Yalgorup System) as per the recommendations of the Ramsar Convention and the EPBC Act 1999
- *Investigating the policy and governance setting* for managing the wetlands. Legislative tools which protect the wetlands in WA are not well known or understood, or easy to interpret. Moreover, these tools are often overlooked in land-use planning decision making. The policies and plans in place to protect the wetlands have never been assessed in order to determine how effective a framework they provide.
- *Identifying the full suite of wetland values:* by reviewing the vast body of literature in outlining the importance of the wetlands for the local community holds for the wetlands
- *Prioritising the threats and risks* both to the ecological character of the system and its effective management
- *Establishing an adaptive management approach:* based on test cases, pilot studies, review of best management practices, and ongoing/regular review.

Support for the preparation of this management plan has been provided through a collaboration of six funding and administrative organisations. The development of this management plan was overseen by the collective participation of stakeholders in the project's Technical Advisory Group (see Acknowledgments).

Ongoing collaboration is crucial in supporting the role of the stakeholders in system-wide management of the wetlands. Ongoing collaboration will help to capitalise upon additional opportunities associated with the actively engaged stakeholder network, including community action and monitoring programs, as well as the planning, management and research programs of various state and local government agencies.

### Aim of the plan

Australia's commitment to managing Ramsar-listed wetlands is supported by the legislative powers of the *Environment Protection and Biodiversity Conservation Act 1999 (Cth)*. Under the Act, the primary purpose of wetland management for declared Ramsar sites is:

- To describe and maintain the ecological character of the wetlands, and
- Formulate and implement planning that promotes:
    - Conservation of the wetland, and
    - Wise and sustainable use of the wetland for the benefit of humanity in a way that is compatible with the maintenance of the natural properties of the ecosystem

Local people are well aware of the recreational and cultural values that support their coastal lifestyles. And whilst education and awareness-raising have improved local knowledge of the natural properties of the wetlands, not many people in the region know of the international importance of the system and the mechanisms in place to protect it.

The challenge for wetland managers is double-edged: managing wetlands for *wise use* includes promoting the important ecological *and* socio-cultural values such as cultural heritage or recreational values. At the same time, wetland wise-use relies on balancing the impending threats of human use.

The aim for Ramsar-site management in the Peel is to manage the wetlands according to our international commitments set out under the Act and the Ramsar Convention and to foster the roles and responsibilities of local stewards of the natural environment.

## Vision

The Peel-Yalgorup wetland system is internationally recognised as a major environmental asset and is highly valued for its biodiversity, and ecological, social, cultural and economic benefits. The diverse wetlands and waterways are managed wisely as a place and space for all to play, learn and live in a sustainable way. We acknowledge our stewardship role in the conservation and protection of the land, water, flora and fauna for the long term.

## Objectives

Following discussions between stakeholders and community members, three objectives for the management plan were identified.

| |
|---|
| OBJECTIVE 1: The System will be managed in accordance with the principle of wise use (conservation of the wetlands and human uses that are compatible with maintenance of the natural properties of the ecosystem) |

In accordance with the Ramsar Convention, the primary purpose of management of a declared Ramsar wetland is to formulate and implement planning that promotes conservation of the wetland, and wise use of the wetland for the benefit of humanity in a way that is compatible with maintenance of the natural properties of the ecosystem.

Wetland wise use and sustainable development will become increasingly important in maintaining the lifestyle and livelihoods of local communities in the region, as the threats to the natural qualities of the wetlands increase with the expanding Peel-Harvey population. Key to this is well balanced land use planning, with clear policy tools and an appropriate governance structure. The goal of wise use also relies on supporting ongoing community participation and education.

OBJECTIVE 2: All stakeholders engaged in active stewardship, for ongoing site management, planning and implementation

According to the Australian Government, wetland management should provide for continuing community and technical input. In fact, this has formed the basis of the participatory management approach that underpins our management plan and that will go on to form the basis for its implementation. This objective supports the Australian Government's commitment to maintaining the ecological character of Ramsar sites in Australia and reflects the important role of stakeholders in achieving this goal.

An important part of this objective is aligning responsibilities between Government Agencies. The Department of Water and Department of Environment and Conservation work closely in managing natural resources in the Peel-Harvey Catchment. Improved collaboration between all stakeholders is key to achieving this objective.



OBJECTIVE 3: The ecological character, including services and values, is maintained or improved to achieve long term positive outcomes

Management and monitoring strategies must be proposed in a way that helps to achieve multiple tasks:

- determining the health of the System (and its components and processes) over time through regular monitoring and assessment of limits of acceptable change
- monitoring the effect of new and existing management strategies;
- revising management strategies over time, by setting out a flexible program; and
- collaborating on the ground by working together with various stakeholders.

This objective sets out the need for adaptive management to ensure that the ecological character of the wetland is being maintained in the short-term and for future generations.

# Ecological Values

Much of the following information is taken from Hale and Butcher's *Ecological Character Description for the Peel-Yalgorup Ramsar site* (2007).

## Criteria for listing

To be nominated as a 'Ramsar Wetland', the properties of a wetland ecosystem must be assessed against the Ramsar Convention's criteria for listing wetlands of international importance and to qualify for listing, the wetland ecosystem must meet at least one of the nine criteria. The Peel-Yalgorup System meets six of the nine criteria for listing (Hale and Butcher, 2007):

Criterion 1: The System contains a representative rare or unique example of a wetland type within the biogeographic region

- The System includes the largest and most diverse estuarine complex in south-western Australia
- The coastal saline lakes and the freshwater marshes included in the System are particularly good examples of each wetland type

Criterion 3: The System supports plants and/or animals that are important for maintaining the biodiversity of a bioregion

- The System is one of only two locations in south-western Australia, and one of very few in the world, where living thrombolites occur in inland waters

Criterion 4: The System supports plants and/or animals in critical stages of their life cycles, or provides refuge during adverse conditions

- Annual use by large numbers of migratory birds
- Drought refuge for large numbers of waterbirds (seasonally and in sporadic, large scale, events)
- Regionally and nationally significant numbers of breeding cormorants, small communities of breeding pelicans; and for bioregionally important populations of breeding Hooded Plover
- Breeding populations of fish, crabs and prawns
- Moulting populations of Australian Shelducks and Musk Ducks (during which the birds are flightless for a short period)

Criterion 5: The System supports 20,000 or more waterbirds

- Annually supports more than 20,000 waterbirds
- The System is the most important area for waterbirds in south-western Australia and regularly supports more than 20,000 waterbirds
- In 1977, over 150,000 waterbirds were recorded in the System

Criterion 6: The System supports 1% of the individuals in a population of a waterbird species, including

- Red-necked Avocet *Recurvirostra novaehollandiae*
- Red-necked Stint *Calidris ruficollis*
- Red-capped Plover *Charadrius ruficapillus*
- Hooded Plover *Thinornis rubricollis*
- Black-winged Stilt *Himantopus himantopus*
- Banded Stilt *Cladorhynchus leucocephalus*
- Curlew Sandpiper *Calidris ferruginea*
- Sharp-tailed Sandpiper *Calidris acuminata*
- Fairy Tern *Sterna nereis*
- Musk Duck *Biziura lobata*
- Grey Teal *Anas gracilis*
- Australasian Shoveler *Anas rhynchotis*
- Australian Shelduck *Tadorna tadornoides*
- Eurasian Coot *Fulica atra*

Criteria 8: The System provides an important source of food for fish, spawning ground, nursery and/or other migration path for fish stocks

- 50 species of fish rely on the Peel-Yalgorup System for nursery, feeding and breeding grounds
- The migratory route of the Pouched Lamprey (*Geotria australis*) includes the Peel-Harvey estuary, a component of the System.

The three remaining criteria, not satisfied in the recent assessment, relate to:

- threatened species and communities (Criteria 2): for this criterion to be satisfied, species registered under national or international lists must be present; the Thrombolite community at Lake Clifton is designated a state-level TEC but is not currently recognised at a Federal level (although the community has recently been nominated for federal assessment)
- Aquatic species (Criteria 7 and 9) for which there is insufficient data to make an accurate assessment.

## Ecosystem components and processes

In order to understand how the System 'works', Hale and Butcher (2007) developed a conceptual model which breaks down the ecosystem into different sets of features:

- *key species and communities:* the features of the wetland which qualify the System against the Ramsar criteria
- *supporting biological components:* those which support the existence of key species and communities
- *habitats:* for key species and communities as well as the other biological components
- physical *(abiotic) components* (Figure 8) which underpin the existence of all other processes

As an example, the thrombolites at Lake Clifton are a key ecological community that directly accounts for the listing of the System under Ramsar Criteria 3. The thrombolites exist through the symbiotic relationship of microorganisms *(supporting biological*

*components)* in an aquatic habitat that provides a precise range of salinity and nutrients *(abiotic components)* which allow the thrombolite community to survive (Figure 8).

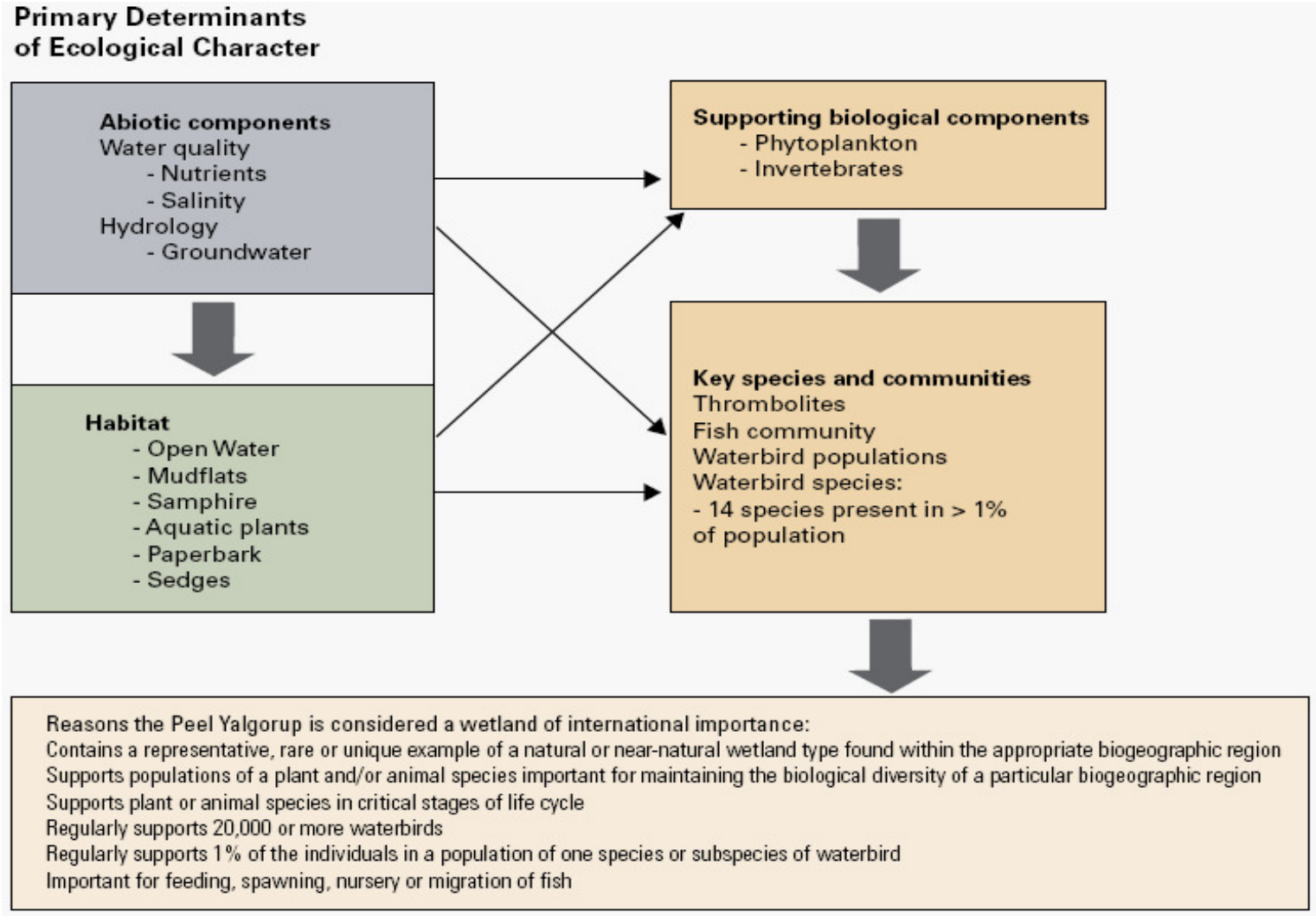


Figure 8: The Peel-Yalgorup System: key species and communities for Ramsar-listing (Hale and Butcher 2007)

## Ecosystem services and benefits

Just as there are *key species and communities* which provide for the System's international recognition, there are another set of wetland functions that support the lifestyle and livelihoods of local communities.

The abundant supplies of Blue Manna crabs are an iconic aquatic species and a central part of the Region's widely valued coastal lifestyle. The Blue Manna crab relies on, a healthy aquatic ecosystemfor its continued survival. It is one example of a benefit to local communities provided by the wetlands (Table 3). A more comprehensive summary of ecological services/benefits is provided in Hale and Butcher (2007), page 106.

Ecosystem benefits and services are defined by the Millennium Ecosystem Assessment as "the benefits that people receive from ecosystems". More specifically, Dudley and Stolton (2007) define benefits as "a resource that is being used to provide direct gains (which could be in terms of money earned, subsistence resources collected or less tangible gains such as spiritual peace or mental wellbeing) to stakeholders. The resources of the protected area become a benefit when they are successfully used to provide such gains". The diversity of services and benefits that wetlands provide make them extremely valuable ecosystems (Schuyt and Brander 2004).

Table 3: Linkages between services/benefits and component/processes: Peel-Harvey estuary fishery (after Hale and Butcher, 2007)

| Benefit/Service | Commercial fishing in the Peel-Harvey estuary |
|---|---|
| Direct components | Populations of edible fish, crabs and prawns |
| Supporting biotic components | Seagrass distribution and extent (habitat for juvenile fish)<br>Invertebrate populations (food source)<br>Phytoplankton populations (food source)<br>Piscivorus birds (predators) |
| Supporting abiotic components | Nutrient concentrations:<br>Primary production (food sources)<br>Eutrophication (loss of seagrass, anoxic conditions)<br>Salinity (tolerance of species affects community composition)<br>pH (acid conditions decrease immunity and increase disease)<br>Toxicants (selenium uptake and biomagnification through the food chain) |
| Threats and threatening processes | Nutrient loads from the catchment<br>Disturbance of Acid Sulfate Soils |

"Wetlands are hugely diverse, but whether they are ponds, marshes, coral reefs, lakes or mangroves, their processes are based on the interaction of basic components – soil, water, plants and animals; It is these wetland processes that generate the products, services and attributes that are valued by humans" (Stuip and Oosterberg 2002).

## Socio-cultural and Economic Values

> "Until it is widely accepted that wetland values can be significant and should be investigated prior to making development decisions, the world's wetland resources will continue to decrease despite many good intentions" Delmar Blasco & Bart Fokkens (after Stuip and Oosterberg 2002)

Whilst protected areas have traditionally been established to protect landscape values, wildlife or biodiversity, there is an increasing awareness of the other values of natural areas for human communities (WWF, 2007).

For example, Blue Manna crabs, as previously discussed, are an important biodiversity value in supporting the wetlands' Ramsar listing (see Criteria 4). They are also a prized resource of the Peel-Harvey Estuary for local communities and support a fisheries industry that, in 2005-06, was worth $13.7 million to the Region's economy (PDC 2008). In many instances, there are elements of the wetlands that the community recognises as important for their personal way of life or for a local, regional or national economy.


The process of articulating wetland values is important for understanding the real costs and benefits of development decisions and can also help in building support for wetland conservation and management, particularly in demonstrating the contribution of protected areas to global, national and local economies (DeGroot et al, 2006). The following section sets out the socio-cultural and economic values of the Peel-Yalgorup System.

### Socio-cultural values

Biodiversity values form an important part of the indigenous cultural heritage in the Peel region. For Noongar people, biodiversity is economically important in that it provides for greater choice, and hence reliability, of food sources and in that many food species were spiritually and symbolically important as totems (Dortch et al, 2006).

In a similar way, the ecological values for the wetlands and fringing coastal plain provided support for settlers to the Peel region at the turn of the 20th century, notably productive soils and estuarine fish (Bradby 1990).

The community has, on a number of occasions, been asked to comment on wetland values as part of other consultation processes in the region. For example, the *State of Play: eastern estuary environmental assessment* (URS 2007) cites "the Peel-Harvey catchment and its waterways are treasured by residents and tourists alike for a range of social, economic and environmental values". In many cases, individuals have listed specific features of the wetlands and waterways such as fishing or amenity.

The following table provides a summary of the community's perceptions of the important components of the wetlands, and includes community comments on a number of wetland management related issues including Foreshore Focus 2020 (City of Mandurah) and Peel 2020. A more detailed account is provided in Appendix B.



Table 4: Socio-cultural wetland values, a summary of references

| **Wetland values: socio-cultural** | |
|---|---|
| **Information source** | **Listed wetland values** |
| Peel Regional Park: planning and community consultation (DPI 2005a and 2005b). listed a number of social-cultural values identified through consultation with local community members at Ravenswood and Mandurah | Land & water-based recreation<br>Lifestyle<br>Aesthetic/landscape values<br>Fishing<br>Heritage – Aboriginal and European<br>Healthy waterways near shore,<br>Urban living by the waterside<br>Accessible land<br>Quality of life<br>Recreation<br>Boating<br>Educational value<br>Foreshore reserves<br>Cultural values<br>Public open space<br>Bird watching<br>Remoteness from others |
| **The *Indigenous Heritage Cultural Assessment* in the Peel-Harvey region (Dortch et al 2007) was undertaken in an area to the east of the Peel-Harvey estuary. This document provides a good indication of traditional use of the landscape by traditional owners, although it is important to note that the Noongar connection to the country was over a much broader range than the area bound within the Ramsar site.** | **Wetlands were highly important in Noongar subsistence strategies:**<br>**Waterways: Peel-Harvey Estuarine System was crucial to Noongar subsistence:**<br>**Foraging in swamps and lakes for amphibians, typha roots, edible rhizomes, crustaceans, reptiles, waterfowl and their eggs.**<br>**Salt marshes surrounding the water bodies of Harvey Inlet and Murray River are among the most productive ecosystems in the world and provide feeding and nesting grounds for migratory birds.** |

| | |
|---|---|
| | **Flora: consumed a range of plants including tubers, fruit from bushes, nectar from eucalypts. Grass tree stumps containing bardi grubs were highly valued.**<br>**Fauna: blue manna crabs, mullet, mulloway, bream and cobbler, insect resources, amphibian and reptile species, ducks and birds, black swans, mammals – eg. Possums and kangaroos. Migratory birds and eggs were sources of food.**<br>**Biodiversity: was economically important as it provided greater choice and reliability of food sources.**<br>**Cultural Values:**<br>**Camping areas where Noongar camped in traditional times: attractive because of proximity to water, being dry and elevated, shade.**<br>**Traditional Knowledge: For example, water from paperbark (Melaleuca) trees could be drunk at any time of year.**<br><br>**Custodians have detailed knowledge about how to procure, prepare and manage resources such as resources for food and bush medicine including yams, berries, edible roots and reeds, seeds, insects, marsupials etc. Tea trees continue to be an important resource for making canes for use in market gardens and cray-pots.** |
| Studies for *Peel 2020* have revealed a broad range of values and aspirations for community development in the Peel. Community involvement in managing the wetlands of the Peel-Yalgorup System is the foundation of the participatory management approach being promoted and for this reason, results of Peel 2020 studies are useful for understanding the link between the community and the natural environment. | Protect and enhance open spaces and greenways.<br>Manage waterways to ensure they are protected for future generations.<br>Protect and conserve water resources promoting a reduction in water consumption in the region.<br>Foster and develop education, community awareness and involvement in protecting the environment.<br>Preserve and enhance Indigenous cultural values in the Peel environment. |
| The City of Mandurah's *Community Charter and Strategic Plan* broadly reflects the importance the community places on the Ramsar-listed wetlands | Protection of environmental assets for future generations<br>Continuous improvement in achieving best outcomes for our community; and<br>Ensuring environmental and economic well-being. |

## Economic values of the wetlands

The ecological benefits and services of the wetlands in the System also have an economic value. To gauge the importance of wetland services and benefits for local communities, a number of methods are available to measure (e.g. a dollar value) or estimate the

contribution of each to the local economy or community. For example, the direct commercial value of the Blue Manna crab can easily be measured by the financial value of the professional fishing industry; measuring the importance of Blue Manna crabs for recreation is not quite so straightforward.

Moreover, wetland economic values are not always so direct. Harvesting Blue Manna (for commercial or recreational purposes) is a 'use' value: a value placed on consumption. There are also economic values of the wetlands which are considered 'indirect uses', like the ability of a wetland to provide flood control or nutrient filtering (an ecosystem service). There are also 'non-use' wetland values which include amenity and landscape values that, for example, contribute to the higher cost of foreshore real estate.

In generating a better understanding the economic value of wetland services and benefits, economists look to determine the *total economic value* of a wetland (Barbier et al 1997) (Table 5). As a first step, the different types of economic values of the wetlands were set out and discussed with reference to any existing information.

Table 5: Total economic value of the Peel-Yalgorup System (after Barbier et al 1997)

| Use Values | | Non-Use Values |
|---|---|---|
| Direct Use Values | Indirect Use Values | Existence Value |
| Commercial fishery | Flood control | Biodiversity |
| Tourism | Pollution control | Cultural heritage |
| Agriculture (cattle grazing at Lake McLarty) | Climate change mitigation | Educational |
| Recreation | Individual well-being | |

According to Tourism WA (2008), the City of Mandurah is the focal point for tourism in the Peel Region although the broader region supports an increasing tourism industry through a 'network of tourist attractions'. During 2005-07, the tourism industry provided for an average of 1.89 million day-trippers /year. In addition, over 400,000 holiday-makers stayed overnight, contributing $139 million to the local economy. Many holiday-makers cited an outdoor activity as their reason for visiting the region, including 'Go fishing' (16%), 'Water activities or sports' (11%), 'Picnics or BBQs' (11%) or 'Bushwalking or rainforest walks' (11%).

The history of agricultural land use in the catchment has long been tied to water quality issues in the coastal part of the catchment and in turn has been the focus of a long-term management program, culminating in the release of a Draft Water Quality Improvement Plan (EPA, 2007). Agricultural values in the greater catchment must be balanced against other values, including the provision of water resources (both commercial and non-commercial) and the provision of other rural-land use products.

Use-values include the provision of food and other materials for which the focus is the commercial estuarine fishery, estimated to be worth more than $1 million/year (URS

2007). The commercial fisheries industry is regulated by the Western Australian Department of Fisheries through annual licences, closed seasons and catch limits. This is complemented by industry-imposed restrictions including no-fish zones (B.Tatham pers. comm.).

Whilst commercial fishing is an important economic consideration for the local community, many of these species also have important cultural values for the Noongar people. Dortch et al (2007) identifies a list of species traditionally taken by Noongar people, many of which continue to be taken as part of the estuarine commercial fishery in Western Australia that in 2004 was worth an estimated $700,000 (Smith and Brown, 2008) (Table 6). In this sense, fisheries in the Peel not only provide commercial and recreational values but were and are also traditionally part of a subsistence resource.

Table 6: Socio-cultural and economic values of fishes: fish species traditionally taken by Noongar people and their current value as part of the commercial estuarine fishery in WA (comprises Peel-Harvey and Swan- Canning (after Dortch et al 2007 and Smith & Brown, 2008).

| Common Name | Scientific Name | Commercial fishery catch (2004) |
|---|---|---|
| Black Bream | Acanthopagrus butcheri | 4.3 t |
| Cobbler | Cnidoglanus macrocephalus | 1.5 t |
| King George Whiting | Sillaginodes punctata | 1.6 t |
| Sea mullet | Mugil cephalus | 74.2 t |
| Yelloweye mullet | Aldrichetta forsteri | 49.5 t |

A long history of cattle grazing is associated with Lake McLarty (DEC 2008). Whilst cattle grazing at the Lake is an enterprise of limited scope (and thus presumed to be of relatively low contribution to local economies), it is thought to have had an important role in shaping the ecological values that qualify the System for Ramsar-listing. Cattle-grazing is believed to have helped maintain open mudflats on the Lake fringes, providing an important habitat for waterbirds, including migratory waders. Recommendations from the Department of Environment and Conservation's Lake McLarty Management Plan include the need for further research into the use of grazing as a management tool.

## Threats and Issues

Through previous consultation processes, representatives of the local community have directly or indirectly commented on their perceptions of threats to the wetlands of the Peel-Yalgorup System. The following section provides a summary of these perceived threats and then compares these with threats identified in the Ecological Character Description for the Peel-Yalgorup Ramsar Site before discussing the local-scale impacts within each wetland subsystem.

### Community perceptions of threats

The following table (Table 7) summarises the communities' perceptions of threats, based on the published results of a number of community engagement sessions. The sessions were held as part of various local planning processes (separate to the preparation of this management plan). A more detailed summary of the reviewed literature is provided in Appendix B.

The results of this literature review revealed a number of commonly raised issues. They include the threat of urban development on the natural assets of the Peel along with the need for effective land use planning (Peel 2020). Recreational and commercial fisheries were also highlighted through Peel 2020, with the need for effective fisheries management.

A number of other facilitative impacts were identified in the literature review: population growth, lack of strategic and appropriate funding support, waste minimisation, unsympathetic culture (amongst local communities) and need for more strategic land-use planning. Each is addressed in the recommended strategies set out in the later section of this plan.

Table 7: Threatening processes and sources

| | Anthropogenic sources of threats | | | | |
|---|---|---|---|---|---|
| Impacts on the wetlands of the Peel-Yalgorup System | Agriculture | Fisheries (comm. & rec) | Urban Development | Recreation | Groundwater Extraction |
| **Direct threats** | | | | | |
| Land clearing | ✓ | | ✓ | | |
| Soil erosion, sedimentation, siltation | ✓ | | ✓ | | |
| Clearing and erosion of fringing veg and buffers | ✓ | | ✓ | ✓ | |

| | | | | | |
|---|---|---|---|---|---|
| Dogs and people: uncontrolled access | | ✓ | ✓ | ✓ | |
| Agricultural sources of nutrients | ✓ | | | | |
| Boating | | ✓ | | ✓ | |
| 4wd/offroad vehicles | | | | ✓ | |
| Water quality & algal blooms | ✓ | | ✓ | | |
| Camping | | | | ✓ | |
| Horse riding | | | | ✓ | |
| Water resource allocation (including extraction, environmental water provisions and drainage) | ✓ | | ✓ | | ✓ |
| Dewatering for urban development | | | ✓ | | |
| Rubbish | | ✓ | ✓ | ✓ | |
| Changing hydrological regime | | | | | ✓ |
| Weeds and ferals (such as foxes and cats) | ✓ | | ✓ | ✓ | |
| Acid Sulfate Soils | ✓ | | ✓ | | ✓ |
| Urban fertiliser use | | | ✓ | | ✓ |
| Dredging | | | ✓ | | |
| Climate Change | | | | | |



The threats highlighted through past community engagement events also compare closely with the sources of threats identified in Hale and Butcher's (2007) ecological character description: recreational (and other lifestyle related threats), agricultural, urban and other development, water resource management and fisheries management are of the highest priority. Also listed in the ECD is climate change, although the anthropogenic cause is less easily controlled within the scope of this management plan.

### Understanding threats, threatening activities and impacts on the wetland assets

In their ecological character description, Hale and Butcher (2007) list the key threats to the Peel-Yalgorup System in a framework that identifies 'threatening activities' (the anthropogenic source of the threat), induced threats, and impacts on the natural asset (Figure 9).

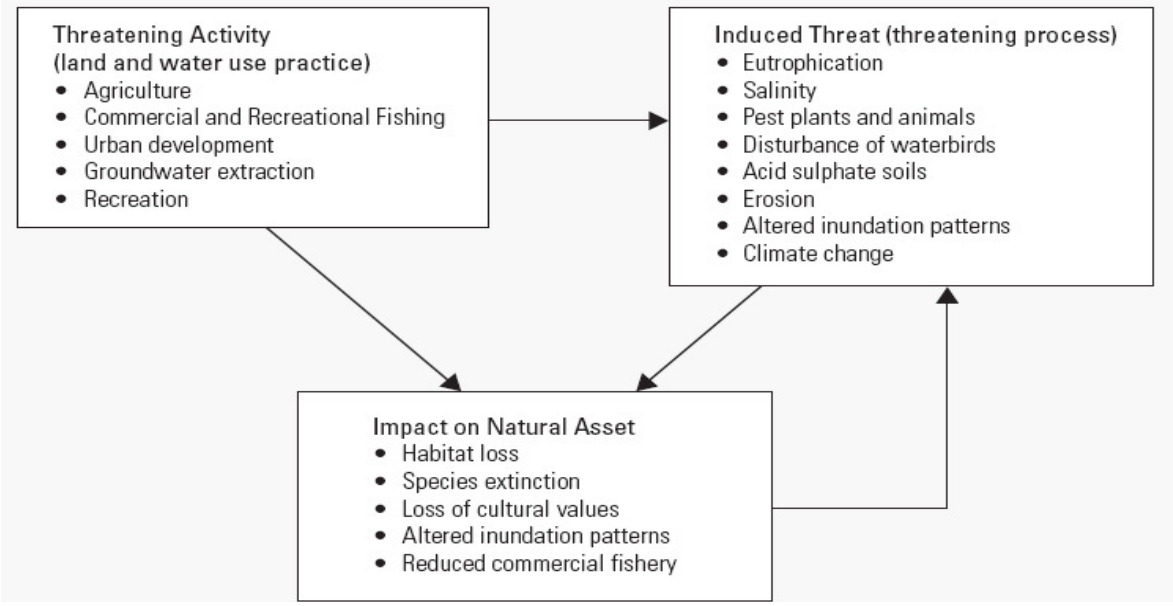


Figure 9: Threats to the ecological character of the System (Hale and Butcher, 2007)

Hale and Butcher (2007) provide further detail in a discussion of threatening activities and their impacts on the natural asset. The authors draw attention to the fact that in the absence of a baseline data set and regular monitoring results, the impacts are not well known.

In order to gain a better understanding of the impacts at a local level, further investigation was undertaken with the help of The Nature Conservancy's Conservation Action Planning tool, using background information from the local level action plans and with the advice of local actors in wetland management. The results of the threat analysis are presented in Tables 8 and 9.

Table 8: Wetlands threats

| **Threats**<br>**Peel-Yalgorup Ramsar Site** | Peel Inlet and Harvey Estuary | Yalgorup Lakes | Lake McLarty System | Goegrup and Black Lakes |
|---|---|---|---|---|
| Acid sulfate soil exposure | Low | Low | Medium | Low |
| Altered patterns of inundation | Low | High | High | Low |
| Changing salinity | Low | High | Low | Low |
| Eutrophication | High | High | Medium | High |
| Foreshore erosion | Medium | Low | - | - |

| | | | | |
|---|---|---|---|---|
| Loss of cultural values | Medium | - | - | Medium |
| Loss of fringing and upland vegetation | High | Medium | Medium | High |
| Pest plants and animals | Low | Low | High | Medium |
| Pollution (other than nutrients) | Low | - | - | - |
| siltation and sedimentation | Low | - | - | - |
| Species extinction | - | Medium | Low | - |
| Waterbird disturbance | High | Low | Low | Medium |

Table 9: Threatening activities

| **Threatening Activities** | Peel Inlet and Harvey Estuary | Yalgorup Lakes | Lake McLarty System | Goegrup and Black Lakes | Overall Threat Rank |
|---|---|---|---|---|---|
| Urban development including dewatering | Very High | High | High | High | Very High |
| Climate change - changing rainfall patterns and sea level rise | High | Medium | Medium | High | High |
| Water use, groundwater extraction and drainage | Medium | Medium | High | High | High |
| Other land use changes (including mining) | High | High | Medium | - | High |
| Unsympathetic culture - lack of awareness or appreciation of wetland values | High | Medium | Medium | Medium | Medium |
| Agriculture - catchment scale | Medium | Medium | Medium | Medium | Medium |
| Recreational use pressures (other than fishing) | Medium | Medium | Medium | Medium | Medium |
| Cattle Grazing | - | - | Medium | - | Low |
| Biological resource use - commercial fishing and recreational fishing | Low | - | - | - | Low |

Strategies and actions aimed at addressing the threats are provided in later sections of this management plan. They incorporate strategic actions as well as local scale on-ground actions as per the recommendations of existing, site-specific action/management plans, where such plans exist.

## Existing action plans

This management plan builds on a number of existing local-scale wetland management and/or action plans. They include plans produced both by government agencies and local community groups (e.g. Lake Mealup Preservation Society); as well as plans which cover smaller, individual, reserves (such as the City of Mandurah's foreshore reserve management plans) through to broader scale reserve management plans prepared and implemented by the State Government (e.g. Yalgorup National Park Management Plan) (Table 10).

These plans are crucial in guiding local scale management actions focused on protecting a restoring the ecological values of each wetland environment and together provide network for on ground action that will form the basis for protecting and restoring the ecological character of the Peel-Yalgorup Ramsar Site (Table 10). This management plan will provide an overarching framework to guide the management of the Ramsar site from a systems based/integrated approach, referring to site level plans to guide local scale management and on ground protection and restoration actions.

Table 10: Wetland action plans

| Peel Inlet & Harvey Estuary | Yalgorup Lakes | Goegrup and Black Lakes* | Lakes McLarty and Mealup |
|---|---|---|---|
| Peel-Harvey Estuary Management Plan 1992 (for review) DoW | Yalgorup National Park Management Plan (for review) DEC | Goegrup and Black Lakes Action Plan (SWALSC) | Lake McLarty Management Plan (DEC) |
| Draft Water Quality Improvement Plan for the Peel-Harvey (EPA) | Thrombolite Recovery Plan (DEC) | Lower Serpentine River Action Plan (City of Mandurah) | Lake Mealup Management Plan (LMPS) |
| Economic Development and Recreation Plan (DoW) | | Serpentine River Management Plan Stage 1 – Goegrup Lake to Barragup Bridge | Lake Mealup Interim Management Guideline (DEC & LMPS in prep) |
| Foreshore Reserve Management Plans including: Conservation Reserve Environmental Management Program, Mariners Cove (Cedar Woods Properties) | | | |

*Includes the Serpentine River reach between Goegrup Lake and the Peel Inlet.

Key to this framework of existing management plans are the following documents, which highlight priority actions for restoring and protecting significant areas within the Ramsar site. A more detailed summary of the recommended actions is provided in Appendices E-G.

*Peel Inlet and Harvey Estuary*

The Department of Water is currently reviewing its 1992 Western Foreshore of the Peel-Harvey Estuary, Draft Management Plan (Waterways Commission, 1992). This action will fill a significant gap in directing on-ground action to restore and protect the ecological values of the estuarine system and will complement the City of Mandurah's suite of foreshore management and concept plans.

A broad scale management program to guide protection and conservation of the ecological values of the estuary is of high priority.

*Yalgorup Lakes*

The Department of Conservation and Land Management (now Department of Environment and Conservation) prepared the Yalgorup National Park Management Plan 1995-2005, with a series of goals for conservation, recreation, community relations, commercial and other uses, interaction with nearby lands and waters and research and monitoring. The plan lists a series of management priorities, including 'High Priority Group 1' (relevant to protecting the conservation values of Lake Clifton and the thrombolite community) and 'High Priority Group 2' (protecting the National Park's broader conservation values). A list of the Group 1 and 2 actions is provided in Appendix E. Review of this management plan, now overdue, is a high priority.

The Interim Recovery Plan (No 153) for the Lake Clifton thrombolite community, produced by the Department of Environment and Conservation (Luu et al. 2004) lists a series of recommendations aimed at protecting and enhancing the conservation values of the Lake Clifton thrombolite community. This plan forms an important part of protecting a key species of the ecological character of the Peel-Yalgorup Ramsar Site.

*Lake McLarty System*

The Lake McLarty Nature Reserve Management Plan No 60 was released on 3rd June 2008 by the Department of Environment and Conservation. The Plan focuses on the two 'class A' reserves that comprise the 219ha of Lake McLarty Nature Reserve; hence over 50% of the land area of the Lake McLarty System is addressed by the Plan.

The Plan identifies the key values for the site including its cultural heritage, importance as a freshwater lake within the Peel-Yalgorup Ramsar site and the protection of the migratory birds who use the lake under the JAMBA (Japan), CAMBA (China) and ROKAMBA (Republic of Korea) migratory bird agreements. Community involvement is highlighted and key actions include consolidation of the land tenure and securing

additions to the reserve where possible; monitoring and managing the lake's water levels, managing water quality, maintaining shorebird habitat and controlling feral predators and pests; maintenance and rehabilitation where necessary of vegetation biodiversity including weed control and addresses disease and fire management and visitor access and use.

*Goegrup and Black Lakes*

SWALSC's Goegrup and Black Lakes Action Plan (2007) also have a focus on protecting and restoring the ecological qualities of the wetlands. The plan notes 'in the last 20 years, there has been a large increase in human population in the Mandurah area, which has resulted in impacts on the Lakes. The plan goes on to outline an approach to restoring ecological values which includes:

- aims to improve the state of the environment by addressing targets such as : reducing sedimentation and erosion, restoring the bushlands around the Lakes, and conserving the biodiversity of the Lakes, and
- Includes a recommendations section, similar to an implementation plan, with detailed activities showing specific timeframe and costing that engage community participation in the management of the lakes.

The plan places strong emphasis on restoration, revegetation, weed control, disease management, water quality improvement and fire management. More detail is provided in Appendix F.

Priorities for immediate action include revision of the local area action plans (where they exist), preparation of local action plans where there are gaps in the network of site level action plans and regular review of The Conservation Action Planning tool, to prioritise local scale actions for the benefit of the Ramsar Site as a whole. Regular review will also be important as more baseline data is collected.

## Policy and legislative framework

"Policies, institutions and governance aspects influence the kind of values that will be taken into account in decision-making and management measures" De Groot et al (2006).

A policy framework aimed at addressing threats to the wetlands of the Peel-Yalgorup System is already in place. The various policy tools work to protect wetland values by making ecological and social wetland values equally important (with economic values) in land use planning. The policy framework is summarised in the following table, highlighting the extensive array of policy tools but also the gaps in the framework.

Table 11: Policy framework: threats to the wetlands of the Peel-Yalgorup System

| Threatening activity | Existing policy documents | Policy gaps |
|---|---|---|
| Agriculture | Draft PHCC NRM Plan<br>Fertiliser Action Plan<br>Peel-Inlet and Harvey-Estuary Management Strategy: Environmental Review and Management Program for the Peel-Harvey Estuary<br>Environmental Protection (Swan Coastal Plain Lakes) Policy 1992 | Sediment and siltation |
| Fisheries (commercial and recreational) | West Coast Estuarine Fisheries Management Plan | |
| Urban Development | Inner Peel Region Structure Plan, 1997<br>Coastal and Lakelands Planning Strategy, 1997<br>Draft Water Quality Improvement Plan<br>Water Sensitive Urban Design Technical Guidelines<br>State Planning Policy 2.9: Water Resources<br>Stormwater Management Manual for Western Australia<br>Environmental Protection (Swan Coastal Plain Lakes) Policy 1992<br>Statement of Planning Policy No 2.1 Peel-Harvey Coastal Plain Catchment<br>Lake Clifton Guidance Statement No. 28<br>Local Planning Policies for the four local municipalities | Planning Strategy for the Peel Region<br><br>Transparent guidelines for buffer determination – specific to the Peel |

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|---|---|---|
| | Environmental Protection (Clearing of Native Vegetation) Regulations 2004<br>Fertiliser Action Plan<br>EPA Guidance Statement No. 33 | |
| Recreation | Peel Waterways Economic Development and Recreation Management Plan | |
| Water resource management (including groundwater extraction) | State Water Strategy<br>Drainage Reform Plan | |

Given the high risk of threats from urban development (table 8), land use planning policy and an adequately resourced planning system are important elements in the management of the wetlands in the Peel-Yalgorup Ramsar Site.

The Yalgorup Lakes environment is strategically covered by the Coastal and Lakelands Planning Strategy and management of the Ramsar-listed area is undertaken in line with the Yalgorup National Park Plan.

However, the Peel region is without a corresponding planning strategy. Furthermore, there is no equivalent up-to-date management plan for the estuarine portion of the Peel-Yalgorup System, although the Department of Water has recently announced its intention to revise its 1992 management program for the Peel-Inlet Management Area.

The Department of Water's *State of Play: Eastern Estuary Environmental Assessment* (URS, 2007) provides clear guidelines for land use planning in the area adjacent to the estuary and Lakes Mealup and McLarty.

Furthermore, the Lake McLarty Management Plan (DEC, 2008, p12) outlines DEC and the Conservation Commission's position on future subdivisions surrounding the Lake: "the Department and Conservation Commission will recommend that any future subdivisions will be subject to the principle of net conservation benefit". The plan also goes on to recommend environmental conditions for proponents of nearby subdivisions. These provide a basis for the following guidelines for wise use.

In the absence of a more detailed review of the existing policy framework the following guidelines are recommended. The guidelines address high level threats and key policy gaps. The wise use guidelines will be regularly reviewed as the policy framework evolves and as more information about wetland threats becomes available.

*Guidelines for wetland wise use*

Finding a balance between competing demands on the wetlands of the Peel-Yalgorup System is a major goal of this management plan. In order to achieve this outcome, clearly defined boundaries and guidelines for land use planning are required. The following guidelines are adapted from the Department of Environment and Conservation's Lake McLarty Management Plan (2008, p12)

1. Minimum setbacks of 100m from the wetland boundary for all new development applications (where the wetland area/boundary includes the full extent of wetland-dependant vegetation.) This distance may need to be increased according to the nature of the proposed development, and should follow the recommendations of DPI's draft Guideline for the Determination of Wetland Buffers, 2005)
2. Fully revegetated setback zones, and an agreed and resourced plan for ongoing management of vegetated buffers, as a condition of development approval
3. Physical separation of private subdivisions from adjacent wetland areas by vehicle-access track and dog-proof fencing, as a condition of development approval
4. Public access associated with new urban developments limited by clearly designated access areas and paved walkways including gates to prevent domestic animal access in areas of high conservation value.
5. Best management practices for water-sensitive urban design applied assessed in all new development applications
6. Demonstrated net conservation benefit from all new developments



## Limits of Acceptable Change

Limits of acceptable change reflect the boundaries of natural variation in a particular wetland component or process (Phillips 2006). They are designed to act as trigger values or limits at a point that would alert managers of an unnatural change in the ecological character of the wetland and/or the influence of threatening processes.

For example, unusual changes in the numbers of Blue Manna crabs caught in the estuary may in part be a response to natural cycles or changes; that is, the natural variability of a population. The limits of acceptable change for Blue Manna crabs would be set at a point where, with regular monitoring, a change in the population beyond the limit would indicate a detrimental change in the ecological character of the System and the need for managers to intervene.

### Current status

Limits of acceptable change were established for many key components and processes highlighted in Hale and Butcher's (2007) account of the ecological character of the Peel-Yalgorup System. In some instances, limits of acceptable change were deemed not to be appropriate as measures of ecosystem health. This is particularly true of features which cannot easily be:

- managed (eg. tidal influence on the estuary) or
- monitored (where the cost of monitoring is prohibitive)

Of the limits of acceptable change that were set, those for 'supporting biotic and abiotic components/processes' provide better indicators of ecosystem health than higher level (dependant) key species and communities (namely thrombolites and birds). Key species and communities are often much more variable and likely to be influenced by a host of external influences. Hale and Butcher (2007) set values for thrombolites and waterbird species, but noted that they are indicative rather than true limits of acceptable change; requiring longer-term monitoring in order to obtain a more accurate picture of ecosystem health.

Table 12: Limits of acceptable change for the Peel-Yalgorup Ramsar site (After Hale and Butcher, 2007)

| Component | | Limit of Acceptable Change |
|---|---|---|
| Peel-Harvey estuary | Nutrients | TP < 30 µg/L (maximum) |
| | | Median concentrations $PO_4$, $NH_4$, $NO_x$ all < 10 µg/L |
| | Dissolved oxygen | 70 – 80 % saturation |
| | pH | pH > 7 at all times |
| | Salinity | Winter salinity in the centre of the Peel Inlet and Harvey Estuary < 30 ppt for a minimum of 3 months.<br><br>Water in the Harvey River mouth over winter < 3 ppt |
| | Phytoplankton | Chlorophyll a – median concentrations < 10 µg/L |
| | Seagrass | Current extent and biomass unknown, Baseline must be set before limits can be made. |
| | Macroalgae | Current extent and biomass unknown, baseline must be set before limits can be made. |
| | Samphire | Current extent and biomass unknown, baseline must be set before limits can be made. |
| | Paperbark | Current extent and biomass unknown, baseline must be set before limits can be made. |
| | Invertebrates | Median CPUE for blue swimmer crabs should not drop below 1.0 kg/trap lift per annum (based on commercial fishing). |
| | Fish | Baseline must be set before limits can be made. |
| Yalgorup Lakes | Nutrients | $PO_4$, $NH_4$, $NO_x$ - median concentrations < 10 µg/L |
| | Salinity | Lake Clifton salinity < 35 ppt maximum and < 25 ppt during winter and spring |
| | Groundwater discharge | Data deficient; a surrogate based on water levels in the lakes may be able to be developed. |
| | pH | pH > 7 at all times |
| | Phytoplankton | Data deficient, baseline must be set before limits can be made. |
| | Macroalgae | Data deficient; No sustained epiphytic macroalgal growth on thrombolites at Lake Clifton |
| | Invertebrates | Data deficient, however, Invertebrate populations sufficient to sustain waterbird populations should be maintained. |
| | Fish | Data deficient, baseline must be set before limits can be made. |
| Lake McLarty | Nutrients | $PO_4$ < 30 µg/L<br>$NH_4$, < 40 µg/L<br>$NO_x$ < 100 µg/L<br>All to be applied only when water levels are > 500mm |

| | | |
|---|---|---|
| | Salinity | Salinity under rush and sedge communities < 1 ppt<br><br>Salinity under paperbark communities < 0.5 ppt |
| | pH | pH > 7 at all times in Lake McLarty. Natural pH is between 7.2 and 8.5 for McLarty, but has declined to between 3.1 and 4 for Lake Mealup. As such a limit for Lake Mealup has not been set, but will need to be based on further investigative work. |
| | Phytoplankton | Baseline must be set before limits can be made. |
| | Aquatic plants | Greater than 50% of open water not covered in floating aquatic plants. |
| | Littoral vegetation | *Typha* limited to < 20 % of the wetland area<br><br>Freshwater sedges covering a minimum of 20% of the wetland area |
| | Paperbark | Data deficient, no decline in paperbark health or extent |
| | Invertebrates | Limit of acceptable change not able to be set. However, Invertebrate populations sufficient to sustain waterbird populations should be maintained. |
| Lakes Goegrup and Black | Nutrients | $PO_4$, $NH_4$, $NO_x$ - median concentrations < 10 µg/L |
| | Salinity | pH > 7 at all times |
| | pH | Winter salinity in the centre of the Peel Inlet and Harvey Estuary < 30 ppt for a minimum of 3 months.<br><br>Water in the Harvey River mouth over winter < 3 ppt |
| | Phytoplankton | Data deficient, limit should be lower than current conditions, further investigations should be undertaken in order to set realistic limits. |
| | Samphire | Data deficient, extent and distribution of samphire within patterns of natural variation. |
| | Paperbark | No change in the condition of paperbark communities. Fringing areas of both freshwater (47 ha) and saltwater paperbark (145 ha) communities.<br><br>No loss of extent of paperbark communities. |
| | Invertebrates | Data deficient, invertebrate populations sufficient to sustain waterbird populations should be maintained. |
| | Fish | Data deficient, baseline must be set before limits can be made. |
| | Waterbirds | Data deficient, baseline must be set before limits can be made. |

NB: Red denotes components/processes for which the current status is outside the prescribed limits (Jennifer Hale, pers comm.).

In many instances, lack of data has prohibited the setting of a trigger value or limit of acceptable change. With this in mind, a monitoring and evaluation guide has been prepared (Hale, 2008) as part of this management planning process. The guide aims to fill data gaps in providing a baseline data set.

However, in considering the data that does exist for relevant parameters, two parameters are considered to be 'out of balance':

- water quality at Lake Mealup, and
- Nutrient concentrations at Lake Goegrup (Hale, pers comm.)

These are high priority issues for further research.

### Knowledge gaps

In some instances, limits of acceptable change for key components and process have not yet been established, owing to the lack of data and background information. Moreover, knowledge gaps also account for a lack of understanding of the impacts of many of the listed threats to the wetlands (see Threats and Issues, p xxx). Key areas requiring further research include:

Peel-Harvey Estuary

- Water quality (Acid Sulfate Soils) comprehensive investigation of the potential and actual threats of Acid Sulfate Soils
- Phytoplankton: monitoring of chlorophyll a concentrations within the estuary
- Aquatic plants: mapping of extent biomass and species composition
- Littoral vegetation: mapping (remote sensing) and condition assessmentfor salt marsh vegetation and paperbark communities
- Fish: community composition and abundance surveys
- Waterbirds: regular systematic comprehensive birds surveys (abundance, species composition, breeding and spatial/temporal trends).

Yalgorup Lakes

- Hydrology: groundwater and lake level monitoring
- Water quality: regular water quality monitoring
- Aquatic plants: monitoring of the charaphytes at Lake Pollard and the extent and duration of *Cladophora* on the thrombolites
- Fish: investigation into potential/actual threat of Black Bream on the thrombolite community
- Waterbirds: analysis of existing data and formalisation of the survey process

Lake McLarty System

- Hydrology: groundwater and lake level monitoring
- Water quality: regular water quality monitoring
- Flora: mapping and condition of sedges/rushes and paperbark community; investigation into the impacts of cattle grazing on the System
- Formal, systematic, regular bird surveys (breeding abundance and habitat usage)

Goegrup and Black Lakes

- Hydrology: water level and tidal fluctuations

- Fish: fish surveys (community composition and abundance)
- Waterbirds (abundance, species composition and breeding)

A detailed outline of the baseline data knowledge gaps is provided in the ECD (page 134).

In addition to the baseline data gaps, knowledge gaps also existing in long term data collection. A monitoring and evaluation guide was prepared to accompany this management plan (Appendix A) with the objectives of

- Inform management of the site against Limits of Acceptable Change (LAC) as detailed in the ECD,
- Guide data collection in order to establish baseline conditions,
- Inform the refinement and review of LAC.

The Monitoring and Evaluation Guide also works to address the absence of a integrated monitoring program for the Peel-Yalgorup Ramsar Site, and highlights the need for wider dissemination of findings from work that is already underway. Collaboration amongst stakeholders in research and ongoing monitoring is crucial in developing a better understanding of the ecological character of the Ramsar Site, and the impacts of threats to the System. Ongoing review and assessment of the limits and monitoring results will also form an essential part of the adaptive management process.

## Strategies and Actions

The following section sets out a first step in an iterative plan for coordinated management of the Peel-Yalgorup Ramsar Site by providing:

- Strategic plan: strategies that will guide collaborative management of the Ramsar site
- An implementation program, outlining relevant stakeholders, resource requirements and timeframes for implementing each of the recommended strategies (Table 13)
- A conceptual model of the recommendations within the adaptive management framework.

Adaptive management is essential. It embodies site specific, dynamic and functional management at local scales and will be underpinned be testing the success of this management plan over time.



### Strategic Plan

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| *OBJECTIVE 1: The System will be managed in accordance with the principle of wise use* | |
| | *Strategy 1: Promote awareness of the wetlands' ecological features and its international importance*<br>• Prepare a communication, education and public awareness raising (CEPA) strategy to promote the international importance of the Peel-Yalgorup Ramsar Site, and our commitments to the Ramsar Convention for wetland 'wise use'. The CEPA plan should address: working with children, use of local examples, working with community groups and indigenous custodians & partnerships with local media<br>• Implement high priority CEPA actions, as per CEPA strategy.<br>• Prepare a report card to the local community on the current status of ecological health of the Ramsar site<br>• Undertake a wetland valuation session to improve knowledge and communication of wetland values<br>• Scope options for a large scale behaviour change project to improve stewardship and conservation of local wetlands and waterways |

*Strategy 2: Define clear boundaries*

- Establish a clear zoning plan for the Ramsar Site with provisions for exclusive nature protection zones (to protect key waterbird species and the thrombolite community of Lake Clifton, and their habitats) nature appreciation zones and recreational use areas, compatible with maintaining the natural properties of the wetland environment.
- Review existing boundary and develop a proposal to extend the Peel-Yalgorup Ramsar Site to better complement the existing reserve network and the proposed Peel Regional Park
- Review existing policy framework for wetland buffer determination and prepare a summary document for distribution to development industry stakeholders

*Strategy 3: Promote the role of Ramsar site management within broader integrated catchment management and coastal zone management*

- Develop a partnerships between catchment NRM organisations and State and Local Government stakeholders to continue the role of the Peel-Yalgorup Ramsar Site Technical Advisory Group
- Expand the number of participants involved in the technical advisory group to include representatives of business and industry groups



*OBJECTIVE 2: All stakeholders engaged in active stewardship, for ongoing site management planning and implementation*

*Strategy 4: Governance policy and procedures: integrating biodiversity conservation with land-use planning to guide regional/local level decision-making*

- Establish and support a Technical Advisory Group. The Technical Advisory group will:
    - Provide technical advice regarding on going management of the Ramsar Site and assessment of management techniques
    - Comprise representatives from all key stakeholder groups including primary stakeholders and local government stakeholders and catchment management organisations
    - Have written support of State and Local Government stakeholders
- Seek an institutional/policy review with the aim of identifying the complementary or conflicting nature of biodiversity conservation and land use planning policy frameworks, with reference to management of the wetlands in the Peel-Yalgorup System
- Incorporate key international and national Ramsar site management obligations and recommendations in local planning policies and strategies in the Shires of Murray, Waroona and Harvey and the City of

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| | Mandurah<br>• Seek a review of the Peel Region Scheme text to make explicit the link between sustainable land use planning and protection of the conservation values within the Peel-Yalgorup Ramsar Site |
| OBJECTIVE 3: Long-term positive outcomes are achieved for the Peel-Yalgorup Ramsar System where the ecological character of the Peel-Yalgorup System, including services and values, is maintained or improved | |
| | *Strategy 5: Managing anthropogenic threats*<br>• Identify carrying capacity of the Ramsar-site wetlands for tourism and boating<br>• Prepare a management strategy to improve water quality at Lake Mealup<br>• Undertake further investigation into nutrient concentrations and Eutrophication risk at Goegrup and Black Lakes<br>• Collect data as per the identified key knowledge gaps, to complete a baseline data including limits of acceptable change. |
| | *Strategy 6: protecting and restoring the ecological values of the wetlands*<br>• Undertaken high priority site-specific management actions (see Appendix E)<br>• Prepare a Conservation Action Plan for the Peel-Yalgorup Ramsar Site, building on recommendations of existing local scale action plans<br>• Seek review of ' Western Foreshore of the Peel-Harvey Estuary' Draft Management Plan' Waterways Commission Report No 30 1992 |
| | *Strategy 7: Work with the community to protect and restore wetland values*<br>• Promote cultural heritage values of the Ramsar Site by establishing an Aboriginal NRM project for the Peel<br>• Seek funding to for the production of a management plan for Aboriginal and European Heritage in the Peel Region (as per Goegrup and Black Lakes Action Plan Recommendation 52).<br>• Establish a waterbird monitoring project aimed at providing capacity building support to local volunteer community groups (see Monitoring and Evaluation Guide, Appendix A) |
| | *Strategy 8: adaptive management - testing targets and monitoring processes*<br>• Implement recommendations of the Monitoring and Evaluation Guide for the Peel-Yalgorup Ramsar Site<br>• Report monitoring results against limits of acceptable change to Technical Advisory Group, State and Australian Governments<br>• Prepare an action strategy for components and processes reported to be outside the relevant limits of acceptable change (as per Monitoring and |

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| | Evaluation Guide)<br>• Report achievement of management plan recommendations to Technical Advisory Group<br>• Review the prescribed limits of acceptable change with 1st year monitoring data<br>• Review management plan recommendations and revise where necessary, releasing new amendments to the management plan as updated 'versions' where required. |

Table 13: Timelines, responsibilities, costs

| Recommendations | Priority | Key Stakeholders | Timeframe |
|---|---|---|---|
| *Strategy 1: Promote awareness of the wetlands' ecological features and its international importance* | | | |
| Prepare a communication, education and public awareness raising (CEPA) strategy to promote the international importance of the Peel-Yalgorup Ramsar Site, and our commitments to the Ramsar Convention for wetland 'wise use'. | High | PHCC, DEWHA, DEC, DOW | Year 1 |
| Implement high priority CEPA actions, as per CEPA strategy. | To be determined | To be determined | Year 2 |
| Prepare a report card to the local community on the current status of ecological health of the Ramsar site | High | DEC, DOW, PHCC | Annual |
| Undertake a wetland valuation session to improve knowledge and communication of wetland values | Low | PHCC PWC | Year 1 |
| Scope options for a large scale behaviour change project to improve stewardship and conservation of local wetlands and waterways | High | PHCC PWC PDC | Year 1 |
| *Strategy 2: Define clear boundaries* | | | |
| Establish a clear zoning plan for the Ramsar Site with provisions for exclusive nature protection zones (to protect key waterbird species and the thrombolite community of Lake Clifton, and their habitats) nature appreciation zones and recreational use areas, compatible with maintaining the natural properties of the wetland environment. | High | DEC DOW DPI PHCC | Year 1 |

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| Review existing boundary and develop a proposal to extend the Peel-Yalgorup Ramsar Site to better complement the existing reserve network and the proposed Peel Regional Park | High | PHCC DEC DPI | Year 1 |
| Review existing policy framework for wetland buffer determination and prepare a summary document for distribution to development industry stakeholders | High | PHCC | Year 1 |
| *Strategy 3: Promote the role of Ramsar site management within broader integrated catchment management and coastal zone management* | | | |
| Develop a partnerships between catchment NRM organisations and State and Local Government stakeholders to continue the role of the Peel-Yalgorup Ramsar Site Technical Advisory Group | High | DEC DOW DAFWA CCWA DPI WAPC PHCC | Year 1 |
| Expand the number of participants involved in the technical advisory group to include representatives of business and industry groups | High | Industry and business groups | Year 1 |
| *Strategy 4: Governance policy and procedures: integrating biodiversity conservation with land-use planning to guide regional/local level decision-making* | | | |
| Establish and support a Technical Advisory Group. The Technical Advisory group will:<br>• Provide technical advice regarding on going management of the Ramsar Site and assessment of management techniques<br>• Comprise representatives from all key stakeholder groups including primary stakeholders and local government stakeholders and catchment management organisations<br>• Have written support of State and Local Government stakeholders | High | All primary and local government stakeholders PHCC SWCC | Year 1 |

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| Seek an institutional/policy review with the aim of identifying the complementary or conflicting nature of biodiversity conservation and land use planning policy frameworks, with reference to management of the wetlands in the Peel-Yalgorup System | High | PHCC | Year 1 |
| Incorporate key international and national Ramsar site management obligations and recommendations in local planning policies and strategies in the Shires of Murray, Waroona and Harvey and the City of Mandurah | High | PHCC | Year 2 |
| Seek a review of the Peel Region Scheme text to make explicit the link between sustainable land use planning and protection of the conservation values within the Peel-Yalgorup Ramsar Site | Medium | PHCC DPI WAPC | Year 2 |
| *Strategy 5: Managing anthropogenic threats* | | | |
| Identify carrying capacity of the Ramsar-site wetlands for tourism and boating | Medium | DOW | Year 1 |
| Prepare a management strategy to improve water quality at Lake Mealup | High | LMPS, DEC, PHCC | Year 1 |
| Undertake further investigation into nutrient concentrations and Eutrophication risk at Goegrup and Black Lakes | High | SWALSC, PHCC, DOW | Year 1 |
| Collect data as per the identified key knowledge gaps, to complete a baseline data including limits of acceptable change | High | All stakeholders | Years 1 and 2 |
| *Strategy 6: Protecting and restoring the ecological values of the wetlands* | | | |

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|---|---|---|---|
| Undertaken high priority site-specific management actions (see Appendix E) | High | - | Years 1 and 2 |
| Prepare a Conservation Action Plan for the Peel-Yalgorup Ramsar Site, building on recommendations of existing local scale action plans | High | PHCC | Year 1 |
| Seek review of ' Western Foreshore of the Peel-Harvey Estuary' Draft Management Plan' Waterways Commission Report No 30 1992 | Medium | DOW | Year 1 |
| *Strategy 7: Work with the community to protect and restore wetland values* | | | |
| Promote cultural heritage values of the Ramsar Site by establishing an Aboriginal NRM project for the Peel | High | PDC, Peel Region indigenous reference group, PHCC, Greening Australia, SWALSC | Year 1 |
| Seek funding to for the production of a management plan for Aboriginal and European Heritage in the Peel Region (as per Goegrup and Black Lakes Action Plan Recommendation 52) | Medium | SWALSC and an appropriate Peel Region Aboriginal Group with input from regional elders | Year 2 |
| Establish a waterbird monitoring project aimed at providing capacity building support to local volunteer community groups (see Monitoring and Evaluation Guide, Appendix A) | High | PHCC, Community groups | Year 1 |
| *Strategy 8: Adaptive management - testing targets and monitoring processes* | | | |
| Implement recommendations of the Monitoring and Evaluation Guide for the Peel-Yalgorup Ramsar Site | High | DEC, DOW, Mandurah Bird Observers, Bird Australia, WA | Year 1 |

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| | | Wader Studies Group; WAMSI, DOF, PHCC | |
| Report monitoring results against limits of acceptable change to Technical Advisory Group, State and Australian Governments | High | DEC, DEWHA, PHCC | Annually |
| Prepare an action strategy for components and processes reported to be outside the relevant limits of acceptable change (as per Monitoring and Evaluation Guide) | High | DEC, DOW, PHCC, DEWHA | As required |
| Report achievement of management plan recommendations to Technical Advisory Group | High | PHCC | |
| Review the prescribed limits of acceptable change with 1st year monitoring data | High | DEC, PHCC | Year 2 |
| Review management plan recommendations and revise where necessary, releasing new amendments to the management plan as updated 'versions' where required | High | DEC, DOW, PHCC | Annually |

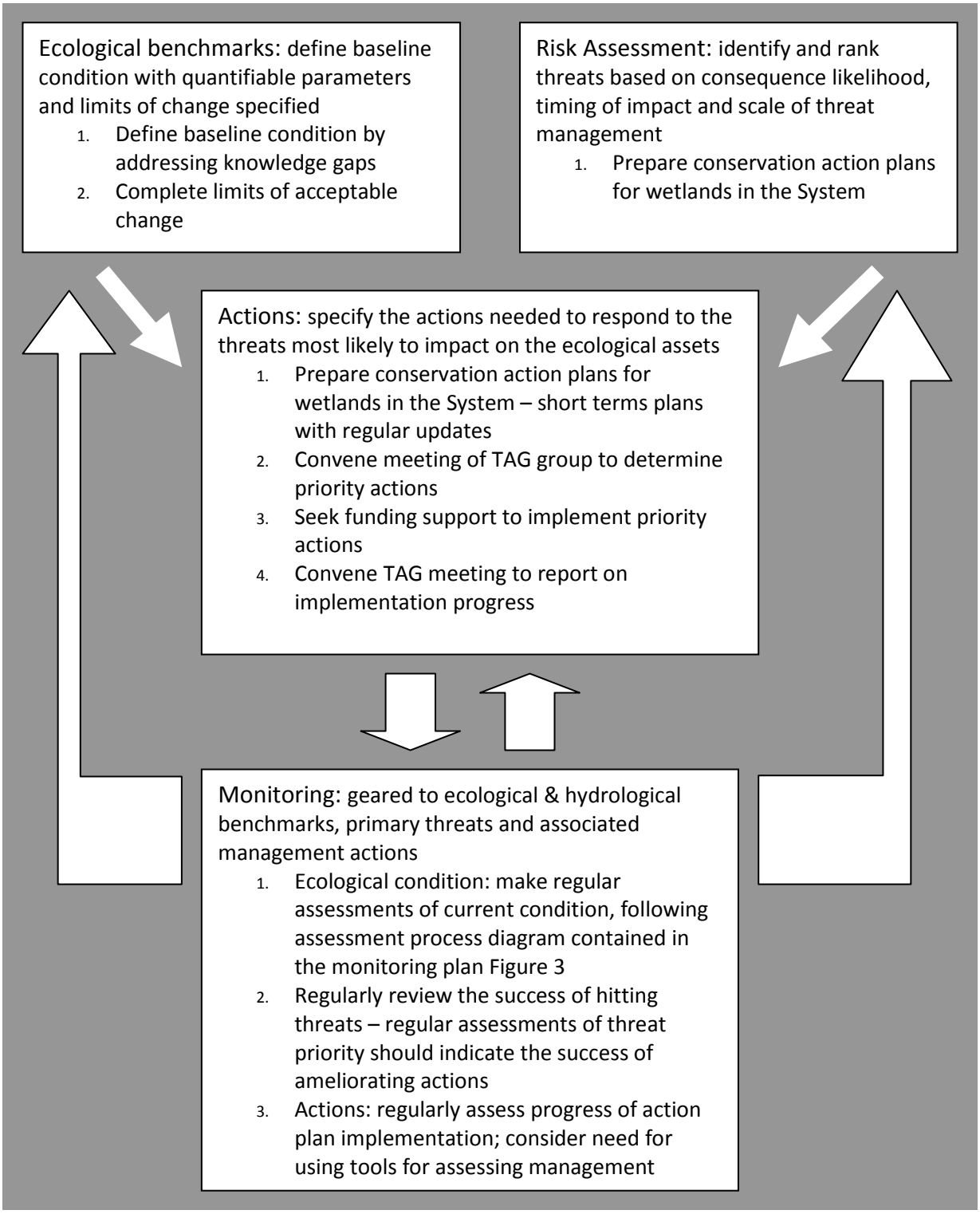


Figure 10: Management actions for the Peel-Yalgorup Ramsar site (after Phillips, 2007 adaptive management model)

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