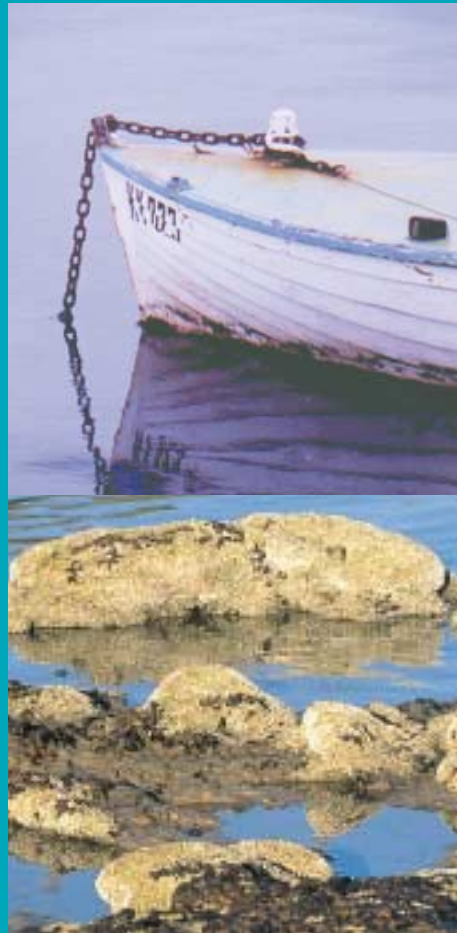


Port Phillip Bay (Western Shoreline) & Bellarine Peninsula Ramsar Site Strategic Management Plan





Parks Victoria developed this Strategic Management Plan in conjunction with the Department of Sustainability and Environment and key stakeholders, and coordinated the public comment process on the draft document.



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This report is prepared without prejudice to any negotiated or litigated outcome of any Native Title Determination Applications covering land or waters within the plan's area. It is acknowledged that any future outcomes of Native Title Determination Applications may necessitate amendment of this report; and the implementation of this plan may require further notifications under the procedures in Division 3 Part 2 of the *Native Title Act 1993* (Cwth).

The plan is also prepared without prejudice to any future negotiated outcomes between the Government/s and Victorian Aboriginal communities. It is acknowledged that such negotiated outcomes may necessitate amendment of this plan.

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1 Introduction

The Strategic Management Plan for the Port Phillip Bay (Western Shoreline) and Bellarine Peninsula Ramsar site is an integral component of a program to develop a comprehensive management framework for Victoria's Wetlands of International Importance (or 'Ramsar sites') listed under the Convention on Wetlands (Ramsar, Iran, 1971). The primary goal of the management framework is to maintain the ecological character of Victoria's Ramsar sites through conservation and wise use. Throughout the Strategic Management Plan the name of the site will be abbreviated to the 'Port Phillip Bay Ramsar site'.

1.1 Strategic Directions Statement

The Strategic Directions Statement establishes Management Objectives for Victoria's Ramsar sites and Statewide Management Strategies to achieve these objectives (NRE 2002a). The Strategic Management Plans for the individual Victorian Ramsar sites apply the Management Objectives and Statewide Management Strategies, promoting a range of specific management actions that will maintain, and in some cases restore, the ecological character of the sites. Individual plans cover 10 of Victoria's 11 Ramsar sites. Victoria's eleventh Ramsar site, the Edithvale-Seaford Wetlands Ramsar site was listed in 2001 and is covered by a separate management plan. A diagram of the framework and related documents is shown below in Figure 1.1.

The Strategic Directions Statement provides the overarching policy framework for managing Ramsar sites in Victoria. It establishes Management Objectives for Ramsar site management across the State, which are then translated to the site-specific level by each of the Strategic Management Plans. The Management Objectives outlined by the Strategic Directions Statement are:

1. Increase the scientific understanding of wetland ecosystems and their management requirements.
2. Maintain or seek to restore appropriate water regimes.
3. Address adverse processes and activities.

4. Manage Ramsar sites within an integrated catchment management framework.
5. Manage resource utilisation on a sustainable basis.
6. Protect, and where appropriate enhance, ecosystem processes, habitats and species.
7. Encourage strong partnerships between management agencies.
8. Promote community awareness and understanding and provide opportunities for involvement in management.
9. Ensure recreational use is consistent with the protection of natural and cultural values.
10. Develop ongoing consistent programs to monitor ecological character.

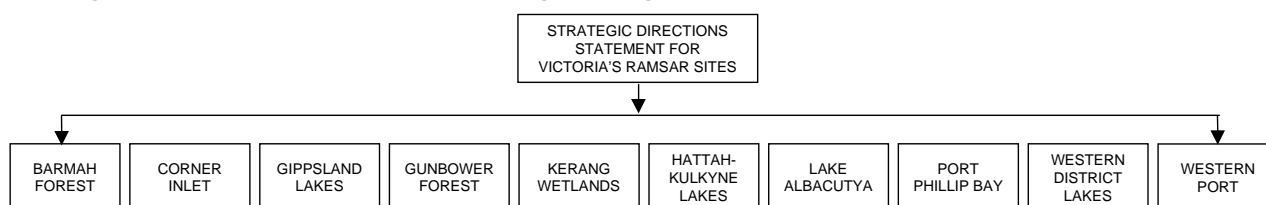
The Strategic Directions Statement also provides background information on the suite of relevant international conventions, as well as related Commonwealth and State policy and legislation which directs and supports the management and utilisation of Ramsar sites. The Strategic Directions Statement and Strategic Management Plans are therefore intended to be read as complementary documents.

1.2 Purpose of the Strategic Management Plan

The primary purpose of the Strategic Management Plan (SMP) for the Port Phillip Bay Ramsar site is to facilitate conservation and wise use of the site so as to maintain, and where practical restore, the ecological values for which it is recognised as a Ramsar wetland. This will be achieved by implementing Site Management Strategies under each of the key objectives (derived from the Strategic Directions Statement).

The SMP for the Port Phillip Bay Ramsar site provides management agencies and stakeholders with an appropriate management framework and the necessary information to ensure that decisions regarding land use and development, and ongoing management are made with full regard for wetland values in environmental, social and economic terms.

Figure 1.1 Framework for the strategic management of Victoria's Ramsar sites



The SMP has been structured in order to:

- provide a comprehensive site description;
- examine the legislation, policy and any related management instruments which direct or otherwise influence management both within and adjacent to the site;
- clarify the roles and responsibilities of management agencies;
- identify the values for which the site is recognised as a Ramsar site;
- assess threats to these values through systematic analysis of both current and potential risks; and
- list and give priority to Site Management Strategies that minimise and, where possible, eliminate identified risks to values.

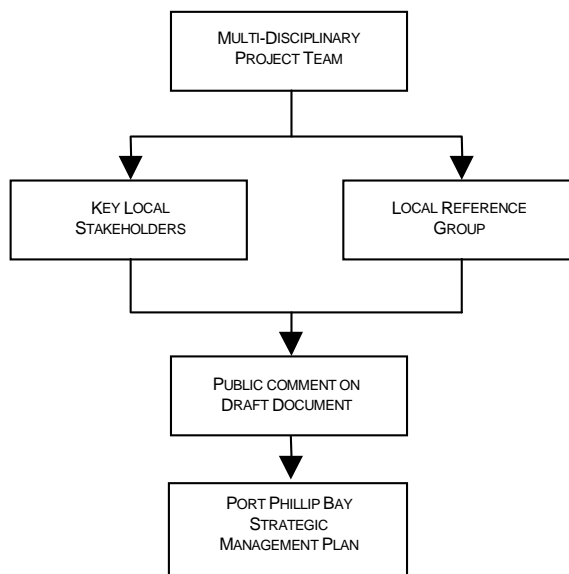
1.3 Consultative framework

The SMP for the Port Phillip Bay Ramsar site has been developed collaboratively through a multi-disciplinary team comprised of Parks Victoria staff from regional and central offices. Throughout the process key local stakeholders have provided input (Figure 1.2).

The SMP is a public document that has been formalised through a government approval process. As such, the SMP was subject to a public comment phase commensurate with State Government consultative processes. All comments received during the public consultation phase were considered in finalising the document.

The SMP is intended to operate over a six-year time frame and will be reviewed every three years to coincide with national reporting requirements under the Convention on Wetlands.

Figure 1.2 Process for developing the SMP for the Port Phillip Bay Ramsar site



2 Ramsar Site Description

2.1 Location

The Port Phillip Bay Ramsar site consists of a number of component areas that include:

- parts of the shoreline, intertidal zone and adjacent wetlands of western Port Phillip Bay, extending from Altona south to Limeburners Bay; and
- parts of the shoreline, intertidal zone and adjacent wetlands of the Bellarine Peninsula, extending from Edwards Point to Barwon Heads and including the lower Barwon River wetlands and Mud Islands.

The areas are:

- Skeleton Creek to Point Cook;
- Western Treatment Plant;
- The Spit Nature Conservation Reserve;
- Avalon Airfield;
- Point Wilson to Limeburners Bay;
- Swan Bay;
- Mud Islands; and
- Lake Connewarre and Reedy Lake.

2.2 Wetland type

Within the Port Phillip Bay Ramsar site a number of wetland types are present that are recognised under the classification system used by the Ramsar convention. These include: six types of marine and coastal wetlands (i.e. permanent shallow marine waters, rocky marine shores, sand shingle or pebble shores, estuarine waters, intertidal mud and sand flats, and intertidal marshes including saltmarsh); two types of inland wetlands (i.e. permanent river/streams/creeks, and permanent freshwater marshes/pools); and two types of artificial wetlands (i.e. irrigated land and sewage treatment ponds).

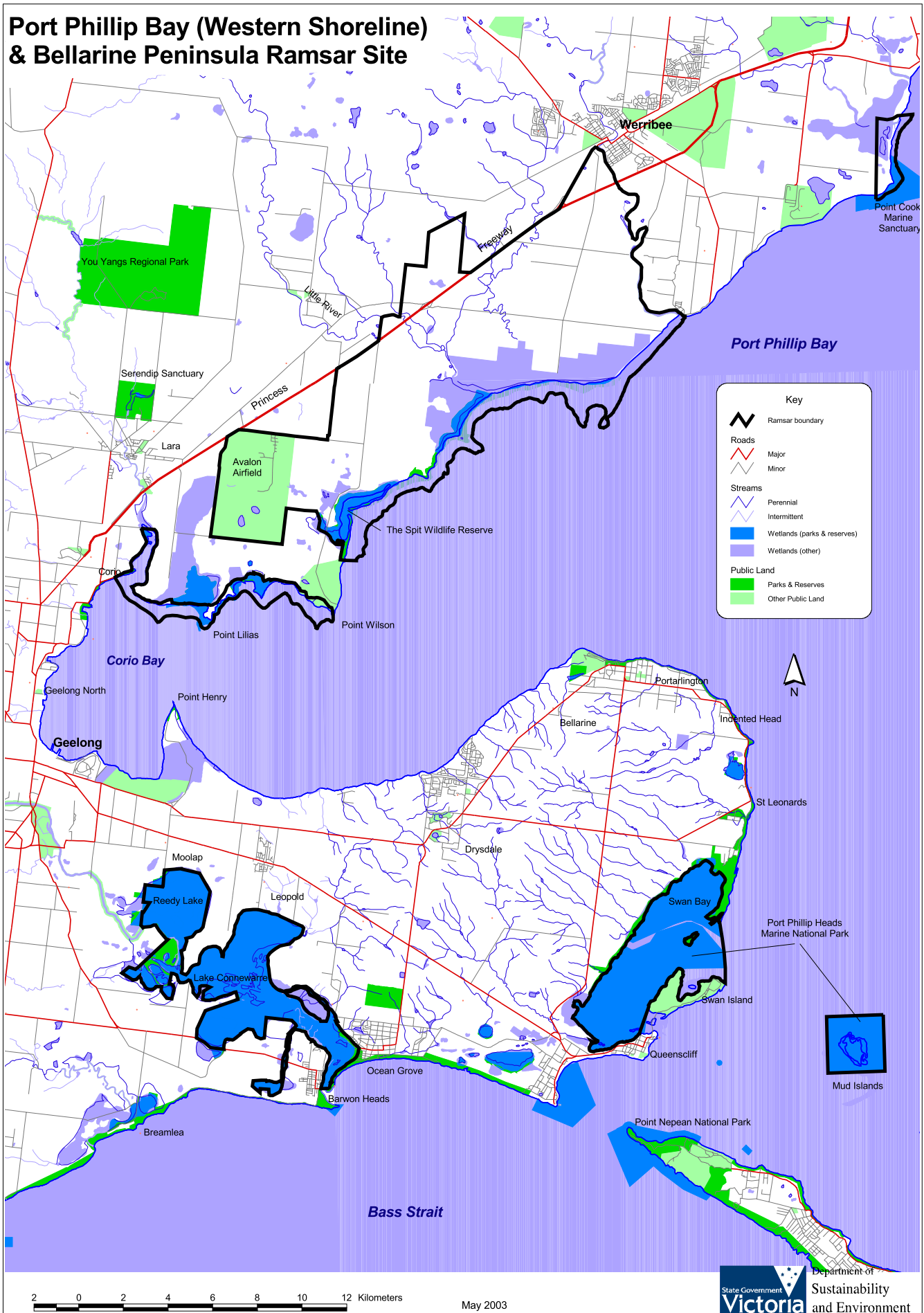
In Victoria, wetlands are classified into eight categories (Corrick and Norman, 1980). The Port Phillip Bay Ramsar site is the only site that contains areas of each of the eight categories recognised under this system. The areas of each category are summarised in Table 2.1

Table 2.1 Area of wetland types in the Port Phillip Bay Ramsar site

Wetland Type	Area (ha) in Port Phillip Bay Ramsar site	Area (ha) in Victorian Ramsar Sites	Area (ha) in Victoria
Deep Freshwater Marsh	719	8,943	54,860
Freshwater Meadow	24	27,568	118,900
Permanent Open Freshwater	3	25,352	154,191
Permanent Saline	3,816	98,459	70,271
Semi Permanent Saline	1,368	12,867	54,604
Shallow Freshwater Marsh	12	8,139	190,695
Salt Works	166	166	2,012
Sewage Treatment Ponds (approx)	1,660	1,660	3,979

Source: NRE Wetland Database (1994 GIS layer)

Port Phillip Bay (Western Shoreline) & Bellarine Peninsula Ramsar Site



2.3 Criteria met for Ramsar listing

To be listed as Wetlands of International Importance or 'Ramsar sites', wetlands must meet one or more internationally accepted criteria in relation to their zoology, botany, ecology, hydrology or limnology and importance to waterbirds. The Ramsar Convention updated the criteria in 1999. The new criteria will be applied to Port Phillip Bay when the site Ramsar Information Sheet is next updated in 2005 (Appendix 9). The former criteria met by the Port Phillip Bay site when listed in 1982 were:

- 1(a) - a particularly good representative of a natural or near-natural wetland characteristic of one, or common to more than one, biogeographical region;
- 1(b) - representative of a wetland which plays an important role in the natural functioning of a major river basin or coastal system, especially where located in a trans-border position;
- 1(c) - a rare or unusual type of wetland in the biogeographical region;
- 2(b) - is of special value for maintaining the genetic and ecological diversity of the flora and fauna of the region;
- 3(a) - regularly supports >20,000 waterbirds;
- 3(b) - regularly supports substantial numbers of individuals from particular groups of waterbirds; and
- 3(c) - regularly supports 1% of the individuals of a population of one species or subspecies of waterbirds.

Information on how Port Phillip Bay Ramsar site meets these criteria is detailed in Chapter 4.

2.4 Land tenure and management

The Port Phillip Bay Ramsar site has a number of components, each managed by one of a number of management agencies. Table 2.2 provides a summary of the land tenure and management agencies for each of the components.

It should be noted that within the Port Phillip Bay Ramsar site there are areas of land that have relatively low or no wetland values. These areas include:

- dryland areas adjacent to the wetlands;
- the non-wetland areas in the Western Treatment Plant to the north of the sewage treatment lagoons and pastures;

- the area of the Ramsar site adjoining the township of Werribee to Farm Road which consists of urban development; and
- Avalon Airport where commercial aviation activities are conducted.

However, these areas are managed consistent with wise use principles and some areas provide a valuable buffer zone that contributes to the maintenance of the ecological character of the wetlands within the site.

On 16 November 2002, 13 Marine National Parks and 11 Marine Sanctuaries were proclaimed in Victoria following an amendment to the *National Parks Act 1975*. The Port Phillip Heads Marine National Park covers an area of 3,500 hectares and includes Swan Bay and Mud Islands in the Ramsar site. The Point Cooke Marine Sanctuary, adjacent to the Point Cook Coastal Park, covers an area of 290 hectares and includes waters within the Ramsar site.

Marine National Parks and Marine Sanctuaries are highly protected areas which contribute to a system representing the range of marine environments in Victoria, and in which no fishing, extractive or damaging activities are permitted.

The Government has also accepted recommendations of the Environment Conservation Council (ECC) for a special management area – Werribee River Estuary – adjacent to the Ramsar site. DSE will work with other management agencies and local government to develop an implementation strategy for protection and management of special management areas, taking into account their unique values. DSE plans to develop the strategy prior to the allocation of any additional aquaculture sites.

ECC recommendations for aquaculture zones at Point Lillias, Kirk Point-Werribee, Avalon and Bates Point were also accepted. The zones cover land and water in or close to the Ramsar site. A detailed management plan must be prepared for the Point Lillias zone which ensures that Ramsar values are protected, that there are adequate buffers between land occupied by aquaculture and high value adjoining areas and that rehabilitation measures are specified to enhance natural values.

Three agencies, the Environment Protection Authority (EPA), the Central Coastal Board and the Port Phillip and Westernport Catchment Management Authority (PPWCMA) (formerly the Port Phillip and Western Port Catchment and Land Protection Board) play important roles with respect to the planning and protection of Port Phillip Bay.

The EPA is responsible for the State Environment Protection Policy 'Waters of Victoria: Waters of Port Phillip Bay', the Central Coastal Board for the implementation of the Victorian Coastal Strategy and the preparation of Coastal Action Plans pursuant to the *Coastal Management Act 1995* and the PPWCMA for facilitating the implementation of the Catchment Action Program (PPWPCALPB 1999) for the Port Phillip Bay catchment.

Management responsibilities in the Port Phillip Bay Ramsar site are summarised in Table 2.3.

2.5 Adjacent land use

A number of different land use types adjoin the Port Phillip Bay Ramsar site. These include:

- agriculture;
- aquaculture;
- conservation;
- port activities;
- recreation; and
- residential.

Mud Islands is surrounded by the waters of Port Phillip Bay.

The Port Phillip Bay Ramsar site component areas are surrounded by the most densely populated part of Victoria, including over 3.5 million people in the cities of Greater Melbourne and Greater Geelong. The amount of residential development occurring around land-based components the Ramsar site will undoubtedly increase. This has the potential to cause significant impacts on wetland values. In particular, urbanisation can reduce the quality of stormwater flowing into wetlands and increase levels of disturbance from humans and domestic pets. It also has the potential to degrade, and in some cases destroy, fauna habitat if areas are not properly protected and managed. Components of the site that have significant urban development adjacent or close to them are:

- Skeleton Creek to Point Cook;
- Western Treatment Plant near Werribee;

- Limeburners Bay;
- Southern Swan Bay; and
- Lake Connewarre State Game Reserve.

Port activities are a significant adjacent land use in southern Swan Bay and Corio Bay (near the Limeburners Bay to Point Wilson segment of the Ramsar site). Elsewhere, agricultural activities, including some intensive horticulture are the primary adjacent land use.

There are a number of important wetlands adjacent to the Port Phillip Bay Ramsar site which contributes to supporting species for which the Ramsar site is recognised. These wetlands include part of the Cheetham Wetlands at Point Cook, coastal wetlands north of Point Wilson, the Avalon Saltworks, wetlands fringing Swan Bay, Swan, Sand, Duck and Rabbit Islands in Swan Bay, private wetlands fringing parts of the Lake Connewarre system, Lonsdale Lakes and Salt Lagoon, St Leonards Wildlife Reserves (Appendix 9).

These adjacent and nearby wetlands provide a valuable buffer to the Ramsar site. They provide additional feeding and roosting habitat for the large numbers of migratory shorebirds that use the Ramsar site and support other waterbirds. Some of these wetlands provide habitat for the critically endangered Orange-bellied Parrot. Protecting the values on adjacent land and in important nearby wetland areas contributes to maintaining Ramsar site values.

The Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC), that came into force on 16 July 2000, identifies Ramsar sites as matters of national environmental significance for which the Commonwealth has a significant responsibility. Wise use principles extend beyond the Ramsar site boundaries. The EPBC Act sets out procedures for assessing actions with potentially significant impacts on Ramsar values, whether these actions are proposed within or outside site boundaries.

Table 2.2 Land tenure and management

Area	Land tenure	Legal status	Management
Skeleton Creek to Point Cook			
Eastern Point Cook Coastal Park including the south-eastern Cheetham Wetlands	Crown Land Reserves	<i>Crown Land (Reserves) Act 1978</i>	Parks Victoria
Port Phillip Bay nearshore waters	Point Cooke Marine Sanctuary	<i>National Parks Act 1975</i>	Parks Victoria
Port Phillip Bay nearshore waters	Unreserved Crown Land	<i>Land Act 1958</i>	DSE (PV manages recreational functions)
Western Treatment Plant			
Werribee – land near Farm Road	Freehold	Private land	Private residential
Western Treatment Plant	Freehold	Private land	Melbourne Water
Port Phillip Bay foreshore adjacent to Western Treatment Plant north of Little River	Port Phillip Bay Coastal Reserve	<i>Crown Land (Reserves) Act 1978</i>	Melbourne Water
Port Phillip Bay nearshore waters	Unreserved Crown Land	<i>Land Act 1958</i>	DSE (PV manages recreational functions)
Port Phillip Bay foreshore adjacent to Western Treatment Plant south of Little River	Port Phillip Bay Coastal Reserve	<i>Crown Land (Reserves) Act 1978</i>	Parks Victoria
The Werribee and Little River banks adjacent to the Western Treatment Plant (to the waterline)	Public land water frontage	<i>Crown Land (Reserves) Act 1978</i>	DSE
The Spit Nature Conservation Reserve			
The Spit Nature Conservation Reserve	Nature Conservation Reserve – Wildlife Reserve	<i>Crown Land (Reserves) Act 1978 and Wildlife Act 1975</i>	Parks Victoria
Avalon Airport			
Avalon Airfield	Commonwealth Land	<i>Airports Act 1996</i>	Avalon Airport Australia under lease from Department of Defence
Point Wilson to Limeburners Bay			
Point Wilson Explosives Area	Commonwealth Land	<i>Defence Act 1903, and Explosives Act 1961</i>	Dept of Defence
Foreshore adjacent to Avalon Saltworks	Public Purposes Reserve	<i>Crown Land (Reserves) Act 1978</i>	DSE
Port Phillip Bay nearshore waters	Unreserved Crown Land	<i>Land Act 1958</i>	DSE (PV manages recreational functions)
Avalon Beach to Limeburners Bay	Port Phillip Bay Coastal Reserve	<i>Crown Land (Reserves) Act 1978</i>	Parks Victoria City of Greater Geelong
Limeburners Lagoon (Hovells Creek) F.F.R	Nature Conservation Reserve	<i>Crown Land (Reserves) Act 1978 and Wildlife Act 1975</i>	Parks Victoria City of Greater Geelong
Swan Bay			
Swan Bay component of the Port Phillip Heads Marine National Park	Marine National Park	<i>National Parks Act 1975</i>	Parks Victoria
Stingaree Bight	Declared Naval Waters	<i>Control of Naval Waters Act 1918</i>	Dept of Defence

Area	Land tenure	Legal status	Management
Mud Islands			
Mud Islands component of the Port Phillip Heads Marine National Park	Marine National Park	<i>National Parks Act 1975</i>	Parks Victoria
Lake Connewarre and Reedy Lake			
Lake Connewarre State Game Reserve	Natural Features Reserve – Wildlife Reserve	<i>Crown Land (Reserves) Act 1978 and Wildlife Act 1975</i>	Parks Victoria
Portion of land between Lake Connewarre and Salt Swamp	Nature Conservation Reserve – Wildlife Reserve		

Table 2.3 Lead management agencies and their key responsibilities

Agency	Responsibility	Local agency	Responsibility
Department of Sustainability and Environment (DSE)	Strategic direction for park and reserve management; flora and fauna management and implementation of the Ramsar Convention in Victoria; catchment and water management, forest management, coastal and port management; leasing, licensing and management of public land, strategic and statutory land use planning including the administration of the Victorian Planning Provisions.	DSE Port Phillip Regional Office, Box Hill	Policy advice for the management of the Port Phillip Bay Ramsar site. Management of hunting and at the Port Phillip Bay Ramsar site.
Department of Primary Industries (DPI)	Provides strategic direction for fisheries management and research, agricultural services and sustainable development of Victoria's energy and mineral resources.	DPI Port Phillip Regional Office, Box Hill	Manage commercial and recreational fishing within the Port Phillip Bay Ramsar site in accordance with the <i>Fisheries Act 1995</i> .
Parks Victoria	Manage parks and reserves, and piers, jetties and recreational navigation aids.	Parks Victoria, Williamstown	As the local authority for the Port of Port Phillip, issue works permits for piers, jetties and recreational navigation structures under the <i>Marine Act 1988</i> .
Municipal Councils	Regulation of land use and development through planning schemes, on-ground works and management of urban and some rural drainage.	City of Wyndham City of Greater Geelong City of Hobsons Bay Borough of Queenscliffe Mornington Peninsula Shire Council	Administer the planning scheme, access to and management of boat ramps.
Committees of Management	Manage reserved Crown Land on behalf of the Minister. Committees are appointed by the Minister.	Parks Victoria Municipalities Elected Committees	Manage reserves for the purposes for which they are gazetted.

Agency	Responsibility	Local agency	Responsibility
Victorian Channels Authority	Establish, manage, dredge and maintain commercial shipping channels; provide and maintain commercial navigation aids; direct and control movement of vessels within commercial port waters.	N/A	N/A
Commonwealth Government	Management of Commonwealth land.	Department of Defence	Manage lease with long-term leaseholder Avalon Airport Australia.
Environment Protection Authority (EPA)	Responsibility for and coordination of all activities relating to the discharge of waste into the environment and the generation, storage, treatment, transport and disposal of industrial wastes and the emission of noise and for preventing or controlling pollution and noise and protecting and improving the quality of the environment.	EPA Geelong	Licence sewerage and other discharges. Monitor water quality.
Victorian Catchment Management Council	Advise State Government on catchment management, and land and water resource issues and priorities. Encourage cooperation between land and water managers. Promote community awareness on catchment management issues.	Corangamite CMA	Implement Regional Catchment Strategies. Prepare and implement Action Plans. Manage surrounding catchment and inflowing streams and drainage.
Urban Water Authorities	Provide water and sewerage service to urban communities and management of specific water supply catchments.	Melbourne Water	Manage drainage and waterways flowing into the northern part of Port Phillip Bay. Manage the Western Treatment Plant.
		Barwon Water	Manage water and sewage collection, treatment and disposal for the Geelong, Surf Coast and Colac Otway Shires and the Borough of Queenscliff. The authority also manages 20 km of the Barwon River through urban Geelong.
Rural Water Authorities	Manage and operate the Irrigation Districts and the Stock and Domestic system, and administer the diversion of water from waterways and the extraction of groundwater.	Southern Rural Water	Manage rural water resources across the southern half of country Victoria, including headworks, surface water and groundwater licensing and irrigation including Werribee Irrigation District.
Victorian Coastal Council	Strategic statewide coastal planning; preparation of the Victorian Coastal Strategy; advise the Minister; monitor development of Coastal Action Plans; and coordinate the implementation of the Victorian Coastal Strategy and Coastal Action Plans.	Central Coastal Board	Develop Coastal Action Plans and guidelines for coastal planning and management within the region; provide advice to Minister and Council on coastal development within the region; and implementation of, and facilitating public awareness of the Victorian Coastal Strategy, Coastal Action Plans and coastal guidelines.
Department of Infrastructure (DoI)	Develop strategies and implement policies for Victoria's ports.	Melbourne Port Corporation	Manage the Port of Melbourne.
		Toll Geelong Port	Manage the Port of Geelong.

2.6 Catchment setting

The hydrological inputs to the Port Phillip Bay Ramsar site are complex. The site is affected by the general health of Port Phillip Bay, the Port Phillip Bay catchment, the Barwon River Catchment as well as more localised catchment impacts including the artificial manipulation of hydrological regimes and nutrient levels at a number of individual wetlands.

The catchment of Port Phillip Bay covers more than 900,000 ha. The catchment is heavily urbanised and there is a significant amount of commercial and industrial activity present including the commercial shipping ports at both Melbourne and Geelong.

Port Phillip Bay receives water from a number of significant rivers including the Yarra, Maribyrnong, Werribee and Patterson rivers. These rivers drain a broad range of land uses from forested areas through agricultural land to urban and industrial land uses. The effect of these processes on the Ramsar site requires further study.

The Werribee and Little River sub-catchments, which drain the catchment above the majority of the Western Treatment Plant area, support agricultural enterprises such as grazing and broad-acre cropping. Some orchards and market gardens exist near Bacchus Marsh and Werribee South where water from the river is used for irrigation. These areas are also likely to come under increasing pressure from urban expansion.

Largely natural areas such as the Wombat State Forest, the Brisbane Ranges National Park, the You Yangs Regional Park, Werribee Gorge and Lerderderg Gorge state parks are located in the catchment and contribute to its health (PPCALPB 1997).

A number of the component wetlands of the Port Phillip Bay Ramsar site are artificial, with hydrology and water quality affected predominantly by artificial processes. In these cases, the health of the wetlands is under the direct control of the site management agencies. It is important to recognise that many of the Ramsar values of these sites are greatly enhanced by these artificial processes.

Cheetham Wetlands and Reedy Lake (within the Lake Connewarre State Game Reserve) have water levels managed directly through pumping and water flow controls. A breakwater structure with adjustable floodgates at the south-east end of Reedy Lake also provides a method of controlling water levels within this lake. The correct maintenance and operation of pumps and water

control structures at these sites is critical to maintaining their Ramsar values.

Approximately 54% of the wastewater from Melbourne travels via the sewerage system to the Western Treatment Plant where it is treated to secondary level then discharged via four drains to the Werribee section of Port Phillip Bay. This has significantly enriched nearby coastal ecosystems and created a large area of artificial wetland habitat but has also contributed to relatively high nutrient loads in Port Phillip Bay. These habitats collectively form an important component of the Port Phillip Bay Ramsar site.

Recent changes to the EPA's discharge licence for the Western Treatment Plant require a reduction in the nutrient load of outputs from the treatment complex. Melbourne Water is addressing this requirement through its Environment Improvement Plan and has put in place an adaptive management approach to manage impacts on Ramsar values arising from potential changes at the Western Treatment Plant. Adaptive management is based on Melbourne Water's investigation and monitoring program of Ramsar values and is carried out in accordance with the draft Ramsar and Conservation Management Plan for the Western Treatment Plant, The Spit Nature Conservation Reserve and Adjacent Habitats (Lane et al. 1999).

Limeburners Bay, Lake Connewarre and Lake Murtnagurt are directly affected by hydrological and water quality changes due to catchment processes and land use.

Lake Connewarre lies at the bottom of the Barwon River catchment and the ecological character of the wetland system depends greatly on water quality and flows in this river. The extensive Barwon River catchment contains some of the most intensively farmed land in Victoria as well as much of the City of Geelong, land uses that directly affect the quality and quantity of water entering the river, and associated wetlands.

The upper part of the southern Barwon River catchment includes the densely forested northern slopes of the Otway Range and the partly forested southern slopes of the Central Highlands. Forestry activities have been prominent in the European history of this part of the catchment. Many areas of native forest have now been cleared.

Increasingly, areas of plantation forestry involving both native non-indigenous (e.g. Tasmanian Blue Gum) and exotic (e.g. Radiata Pine) species are being developed. The harvest of timber from both native and plantation forests has the potential to

deliver significant quantities of sediment to the Barwon River and subsequently the Lake Connewarre component of the Ramsar site. The balance of the Barwon River catchment is devoted largely to agriculture, primarily wool, milk, meat, crops and horticulture.

The local catchment of Lake Connewarre includes grazing land and the towns of Ocean Grove and Barwon Heads. The local catchment of Reedy Lake (approximately 27 km²) includes farmland (including some intensive horticulture), and rural residential and urban development on the eastern edge of Geelong and around the town of Leopold.

Lake Murtnagurt is connected by a floodway to the Lake Connewarre system but also receives runoff from a small catchment that includes some grazing land as well as urban and rural residential land around the township of Barwon Heads.

The Swan Bay catchment includes much of the eastern part of the Bellarine Peninsula, which consists of mostly agricultural and rural residential land. These surrounding land uses have a major influence on the quality of the water that enters Port Phillip Bay from Swan Bay. Urban development adjacent to the southern end of Swan Bay is also a significant determinant of the quality of water entering Port Phillip Bay.

2.7 Local Government

Local government jurisdiction in the component wetlands of the Port Phillip Ramsar Bay site is summarised below.

- City of Hobsons Bay (north of Skeleton Creek);
- City of Wyndham - Skeleton Creek to Point Cook and approximately two-thirds of the Western Treatment Plant;
- Borough of Queenscliffe - southern Swan Bay; and
- All remaining components lie within the City of Greater Geelong.

The suite of relevant international conventions, and the Commonwealth and Victorian legislation and policy that directs management and use of Ramsar sites, are outlined in the Strategic Directions Statement. This Chapter covers the local policy framework comprising plans, strategies and municipal planning provisions as well as statewide strategies approved after publication of the Strategic Directions Statement.

3.1 Strategies

In October 2000, the Port Phillip Bay Ramsar site was added to the East Asian-Australasian Shorebird Site Network. The establishment of a shorebird network is a key action of the Action Plan for the Conservation of Migratory Shorebirds in the East Asian-Australasian Flyway: 2001-2005, which in turn is a key component of the Asia-Pacific Migratory Waterbird Strategy: 2001-2005. This plan includes strategies to conserve shorebirds and protect their habitat.

There are a range of existing plans and strategies that provide for the protection and enhancement of the natural and cultural values of the Port Phillip Bay Ramsar site. Victoria has a strong planning framework and as a result these plans and strategies have a high level of integrated planning and address many aspects of sustainable use.

Publicly released strategies and reports that are particularly relevant to the management of the Port Phillip Bay Ramsar site and its catchment include:

- State Environmental Protection Policy 'Waters of Victoria: Waters of Port Phillip Bay' (EPA 1997);
- Government Response to the Environment Conservation Council's Marine, Coastal and Estuarine Investigation Final Recommendations (2000).
- Melbourne 2030 (DPI 2002).
- Port Phillip Bay Environmental Management Plan (NRE 2002).
- Port Phillip and Westernport Regional Catchment Strategy (PPCALPB 1997);
- Corangamite Regional Catchment Management Strategy (CCMA 1997);
- Draft Port Phillip and Western Port Native Vegetation Plan (PPCALPB 2000); and
- Western Treatment Plant Environment Improvement Plan (MWC 2000);

- Former Land Conservation Council recommendations for the Melbourne Region;
- Point Cook Coastal Park and Cheetham Wetlands Strategy Plan (PV 1997);
- Swan Bay Marine and Wildlife Reserves Proposed Management Plan (DCE 1991);
- Western Treatment Plant and The Spit Wildlife Reserve Conservation Management Action Plan (MWC 2000); and
- Lake Connewarre State Game Reserve Management Plan (DCNR 1993).

Melbourne 2030 is a 30-year plan to manage growth and change across metropolitan Melbourne and the surrounding region. It gives a high-level overview of the directions metropolitan Melbourne is expected to take. Its focus is the management of future growth, land use and infrastructure investment.

A number of strategies that will have a bearing on the management of the Port Phillip Bay Ramsar site are currently in preparation or being reviewed. These include:

- Draft Ramsar and Conservation Management Plan - Western Treatment Plant, The Spit Nature Conservation Reserve and Adjacent Habitats (Lane et al. 1999);
- Management Plan for Limeburners Bay (being finalised by the City of Greater Geelong);
- Avalon Beach Management Plan (currently being reviewed by DSE); and
- Draft Avalon Airport Master Plan (currently being reviewed by Department of Defence).

Werribee Plains – A Vision for Sustainable Growth (NRE 2002e) is a recent Victorian Government initiative to transform Melbourne's west into a region recognised for environmentally sustainable development. The area covered by the project is almost 3,000 km² and includes areas within the Port Phillip Bay Ramsar site. A key aspect of the vision is the use of recycled water from the Western Treatment Plant for urban, industrial and agricultural development and environmental purposes. A business plan for the vision will be released in 2003. Planning for the Werribee Plains project will take account of Ramsar values and the need to maintain the ecological character of the site.

Catchment management authorities in Victoria are currently reviewing their regional catchment strategies. The revised regional catchment

strategies, once accredited by government, will guide future investment in the catchment under some State natural resource management programs, the National Action Plan for Salinity and Water Quality and the Natural Heritage Trust. This strategic management plan will be recognised under the Corangamite and Port Phillip and Westernport Regional Catchment Strategic frameworks.

Three recently developed statewide strategies are relevant to the management of Port Phillip Bay Ramsar site.

The Victorian River Health Strategy (VRHS) provides a framework that enables Government and community to manage and restore rivers in the State. The VRHS aims to achieve healthy rivers, streams and floodplains which meet the environmental, economic, recreational and cultural needs of current and future generations (NRE 2002d). The VRHS establishes regional planning processes for CMAs to prepare regional river health strategies which will coordinate other river-related action plans and direct the development of annual works programs.

The Indigenous Partnership Strategy (NRE 2001) provides the framework for building effective relationships with Indigenous communities, who have a fundamental role in the management of Victoria's natural resources, as traditional custodians of the land and waters. This strategy sets out key initiatives to assist in the development and delivery of services to Indigenous people, which should be applied during management planning.

Victoria's Native Vegetation Management – A Framework for Action (NRE 2002d) establishes the strategic direction for the protection, enhancement and revegetation of native vegetation across the State. The framework focuses on managing native vegetation to provide sustainable landscapes and to protect productive capacity and environmental values of land and water resources.

3.2 Municipal Strategic Statements, zoning and overlays

The Cities of Wyndham, Greater Geelong, and the Borough of Queenscliffe have prepared Municipal Strategic Statements, consistent with the requirements of the Victorian Planning Provisions. These statements provide policy direction for Councils and include a range of commitments related to environmental protection, including waterways, wetlands and biodiversity, of relevance to the wise use of the Port Phillip Bay Ramsar site.

Zoning pursuant to the *Planning and Environment Act 1987* has been applied to the components of the Port Phillip Bay Ramsar site in the local planning schemes to control land use and development. The Public Conservation and Resource Zone (PCRZ) has been applied to many of the public land components of the site (especially coastal and nature reserves). The PCRZ allows for the protection of areas of significance. The PCRZ aims to:

- protect and conserve the natural environment and natural processes for their historic, scientific, landscape, habitat or cultural values;
- provide facilities which assist in public education and interpretation of the natural environment with minimal degradation of the natural environment or natural processes; and
- provide for appropriate resource based uses.

The Western Treatment Plant is zoned Public Use Zone 1. In addition the Borough of Queenscliffe has applied an Environmental Rural Zone (ERZ) in much of the Swan Bay catchment adjacent to the Ramsar site to protect water quality in Swan Bay. The ERZ aims to:

- conserve and permanently maintain flora and fauna species, soil and water quality and areas of historic, archaeological and scientific interest and areas of natural scenic beauty or importance so that the viability of natural ecosystems and the natural and historic environment is enhanced;
- encourage development and the use of the land which is in accordance with sound management and land capability practices, and which takes into account the environmental sensitivity and the biodiversity of the locality; and
- ensure that subdivision promotes effective land management practices and infrastructure provision.

The ERZ requires planning permits for a broad range of activities with potential impacts on soil, water and biodiversity. In this way, Councils can exercise tighter control over works and development.

The Ramsar site is covered by overlays within the planning schemes of the three municipalities. Relevant overlays used to cover the coast include:

- Significant Landscape Overlay (SLO), the aim of which is to regulate uses close to the sensitive coastal landscape of Port Phillip Bay (numbers and detailed provisions vary slightly between municipalities);
- Environmental Significant Overlay (ESO), the aim of which is to regulate uses close to and in environmentally significant areas around Port Phillip Bay (again, numbers and detailed provisions vary slightly between municipalities); and

- Overlay provisions covering the protection of Ramsar wetlands within the City of Greater Geelong (implemented in July 2000).

Table 3.1 summarises the overlays in each municipality that cover the Port Phillip Bay Ramsar site and adjacent land.

Table 3.1 Planning scheme overlays covering the Port Phillip Bay Ramsar site and adjacent private land.

Municipality	Overlays
City of Wyndham	<ul style="list-style-type: none"> • SLO1: Werribee River. • SLO2: Skeleton Creek (including Dry Creek Tributary).
City of Greater Geelong	<ul style="list-style-type: none"> • ESO2: High Value Wetlands and Associated Habitat Protection. • SLO2: Geelong Coast.
Borough of Queenscliffe	<ul style="list-style-type: none"> • ESO1: Coastal and Foreshore Areas. • ESO2: Swan Bay and Marine and Terrestrial Habitats.

The key environmental values of the Port Phillip Bay Ramsar site for which it was listed (representativeness, function, rarity, flora and fauna, and waterbirds) are summarised below. Other values described include cultural heritage, scenic, economic, education and interpretation, recreation and tourism, and scientific (see Appendix 9).

4.1 Wetland representativeness

In Victoria wetlands are classified into eight categories. The Port Phillip Bay Ramsar site includes areas of all eight wetland types including areas of the State’s most depleted wetland habitats and wetlands least represented in Victoria’s protected area network (Table 4.1). Of note, the site represents most of the artificial wetland types in the State.

4.2 Flora and fauna

The Port Phillip Bay Ramsar site is of special value for maintaining the genetic and ecological diversity of the flora and fauna of the region.

The Port Phillip Bay Ramsar site accommodates 579 non-marine flora species, of which at least 42% are non-indigenous and 304 species of fauna, 19 of which are non-indigenous (NRE 2000a).

Flora

Five hundred and seventy nine species of non-marine flora have been recorded within the Port Phillip Bay Ramsar site, 247 of which are non-indigenous species. There are two nationally threatened species and 22 Victorian threatened species recorded in the Ramsar site on the DSE Victorian Flora Information System. Two species are classed as endangered in Victoria, 4 are classed as vulnerable; 12 as rare and 4 as poorly known species in Victoria and suspected of being rare, vulnerable or endangered. Three species are listed under the *Flora and Fauna Guarantee Act 1988*. These species are listed in Appendix 4. In addition, Melbourne Water has recently reported the occurrence of Spiny Rice-flower at the Western Treatment Plant. The plant is critically endangered nationally.

Table 4.1 Representativeness of Victorian wetland types in the Port Phillip Bay Ramsar site

Wetland Type	Pre-European area (ha) in Victoria	Area (ha) remaining in Victoria	Area (ha) in Victoria’s protected area network	Ramsar coverage in Victoria (ha)	Port Phillip Bay Ramsar site (ha)
Deep Freshwater Marsh	-	-	-	8,943	712
Freshwater Meadow	181,246	118,899	8,312	27,568	24
Permanent Open Freshwater	70,658	190,694 ¹	55,729	25,352	3
Permanent Saline	155,608	154,191	70,778	98,459	3,816
Semi-permanent Saline	67,404	70,272 ¹	40,409	12,867	1,368
Shallow Freshwater Marsh	127,031	54,603	9,410	8,139	12
Saltworks	-	2,012	-	166	166
Sewage Treatment Ponds	-	3,979	-	1,660	1,660

¹ the increase from Pre European area in Victoria to area remaining in Victoria is due to the construction of dams, weirs and other impoundments.

Data source: DSE Corporate Geospatial Data Library

Fauna

For the Ramsar site, 29 species of fauna are listed under the *Flora and Fauna Guarantee Act 1988* and Action Statements under the Act have been prepared for eight species (Appendix 5). Seven fauna species are classed as critically endangered in Victoria, 14 as endangered, 28 as vulnerable and 25 as lower risk-near threatened. One species is classed as being insufficiently known, but suspected of being in one of the above categories. Ten species are threatened at the national level. A list of these species is included in Appendix 5.

All main parts of the Port Phillip Bay Ramsar site support threatened species. Wetlands that support the highest numbers of threatened species are Werribee/Limeburners, Lake Connewarre and Point Cook.

The Port Phillip Bay Ramsar site contains the most important known wintering sites for the critically endangered Orange-bellied Parrot, with highest numbers occurring at The Spit, the Western Treatment Plant, Swan Bay and on Swan Island (adjacent to the Ramsar site) and Lake Connewarre. Marine mammals also occur in and adjacent to the Ramsar site, including the Bottlenose Dolphin, Common Dolphin, Leopard Seal and the Australian Fur Seal (NRE 2000a).

The Port Phillip Bay Ramsar site supports 40 species listed under the China-Australia Migratory Bird Agreement (CAMBA), 36 species listed under the Japan-Australia Migratory Bird Agreement (JAMBA) (NRE 2000a) and 49 species listed under the Bonn Convention on the Conservation of Migratory Species of Wild Animals. These figures represent the most recorded at any of the Victorian Ramsar sites. Waterbirds are covered in more detail in Section 4.3.

4.3 Waterbirds

The Port Phillip Bay Ramsar site was designated primarily in recognition of its high value as habitat for waterbirds. The site hosts 36 bird species under JAMBA and 40 species under CAMBA (see Appendix 6) and is an important drought refuge for a number of species when inland lakes and wetlands dry out.

Ramsar and non-Ramsar listed wetlands in Port Phillip Bay together regularly support over 60,000 shorebirds during the summer months. This makes the Port Phillip Bay the most important single marine embayment on the Victorian coast for shorebirds and one of the top ten sites in Australia (Lane 1987).

The Port Phillip Bay site is of international importance for 12 species of shorebird (supporting >1% of the flyway population) and of national importance for two species of shorebird (supporting >1% of the Australian population) (Watkins 1993) including:

- Double banded Plover;
- Curlew Sandpiper;
- Red kneed Dotterel;
- Red necked Stint;
- Red necked Avocet;
- Sharp tailed Sandpiper;
- Pied Oystercatcher;
- Banded Stilt;
- Eastern Curlew;
- Grey Plover;
- Ruddy Turnstone;
- Pacific Golden Plover;
- Common Greenshank; and
- Marsh Sandpiper.

Data in Watkins (1993) provides an indication of the relative importance of different wetlands in Port Phillip Bay for migratory and resident shorebirds (mostly those listed under the JAMBA and CAMBA treaties). Table 4.2 summarises the comparative importance of each wetland for each species of shorebird.

Mud Islands is a significant breeding site for Straw-necked Ibis, White Ibis, Caspian Terns, Crested Terns, and Royal Spoonbills. Some shorebirds such as the Fairy Tern are breeding unsuccessfully at traditional nesting sites within Port Phillip Bay or abandoning these sites altogether. Human disturbance through a range of recreational activities is thought to be one of the major causes of this reduced breeding activity of shorebirds (Collins et al. 2000; Paton et al. 2000).

There are also a number of significant roost sites for shorebirds found within the Port Phillip Bay Ramsar site. These sites include Mud Islands, Swan and Sand Islands, the northern shores of Swan Bay (including Edwards Point), Point Wilson, the Western Treatment Plant, the Avalon Saltworks and the Cheetham Wetlands.

The most important sites for shorebirds, in terms of populations, are incorporated into the Ramsar site, with the exception of the Geelong saltworks, and parts of the Avalon saltworks, which are an integral part of the Werribee - Avalon wetlands. Sand Island in Swan Bay and the western shore of Swan Bay are also not included in the Ramsar

site.

In addition to shorebirds, the Port Phillip Bay Ramsar site supports significant numbers of other waterbirds. The Western Treatment Plant and the Connewarre wetlands are the two most significant wetland areas for swans, ducks, grebes and coots, in terms of both numbers and diversity. The Cheetham Wetlands and Swan Bay also support significant numbers of Black Swans and Chestnut Teal. The two saltworks support large numbers of Australian Shelduck.

Mud Islands support the largest colonies of breeding waterbirds and seabirds in Port Phillip Bay. These include over 2,000 pairs of Crested Terns, possibly as many as 5,000 White-faced Storm Petrels (one of only three colonies in Victoria), several hundred Australian Pelicans and

many thousands of Straw-necked Ibis and a small colony of Yellow-billed Spoonbills.

Breeding colonies of up to 40 Fairy Terns have occurred in the past at The Spit, Swan Island and Mud Islands within the Ramsar site. Breeding colonies of Pied Cormorants occur at the Western Treatment Plant and in the northern bay of Swan Island (Stingaree Bay). Several thousand Straw-necked Ibis and hundreds of White Ibis breed at Reedy Lake, provided there is sufficient emergent vegetation on which they can build their nests. Most waterbird and seabird breeding occurs in the spring and summer months, although the Pied Cormorant at the Western Treatment Plant tends to breed in autumn/winter to early spring.

Table 4.2 Numbers and relative importance of Port Phillip Bay wetlands for significant populations of shorebirds (source: Watkins 1993)

	Altona– Laverton	Werribee– Avalon	Connewarre Wetlands	Swan Bay - Mud Islands
Species				
Double-banded Plover	631	955	-	351
Pacific Golden Plover	178	-	-	255
Grey Plover	-	-	-	570
Red-kneed Dotterel	-	436	-	-
Pied Oystercatcher	-	108	-	-
Banded Stilt	3,650	2,388	-	-
Red-necked Avocet	1,498	-	-	-
Eastern Curlew	-	-	-	808
Ruddy Turnstone	-	-	-	293
Common Greenshank	-	-	-	310
Marsh Sandpiper	-	-	230	-
Sharp-tailed Sandpiper	2,986	5,207	8,424	1,694
Red-necked Stint	9,536	13,41	4,630	7,207
Curlew Sandpiper	9,025	13,323	4,820	3,679

Figures in **bold type** = internationally significant population level (>1% of estimated flyway population);
 Figures in normal type = nationally significant population (>1% of estimated national population).

4.4 Natural function

The Ramsar Convention defines ‘natural function’ as the interactions of physical, biological and chemical components of wetlands, which enable them to perform certain natural functions and therefore making them a vital element of the landscape.

Although wetlands such as the Cheetham Saltworks and the Western Treatment Plant are artificial, the ecological processes that they create

are significant in sustaining values of significance under the Ramsar Convention. The wetlands of the Port Phillip Bay Ramsar site provide a range of important natural functions including:

- groundwater recharge or discharge;
- water purification through filtering and retention of sediments and reusing nutrients;
- water storage, flood storage and control, maintenance of flow regimes and erosion control;

- high rates of nutrient recycling;
- sewage treatment;
- shoreline stability; and
- retention of sediment and pollutants.

Areas where these functions are particularly critical are at Werribee where the coastal wetlands absorb and recycle a large amount of the nutrients and other pollutants from the Western Treatment Plant. In the process these wetlands generate a highly productive and valuable enriched coastal ecosystem. The Connewarre wetlands also absorb and recycle sediment, nutrients and other pollutants from the Barwon catchment, improving water quality and flows in the lower Barwon River and adjacent coastal waters.

4.5 Cultural heritage

Due to their resource-rich nature the wetlands in and adjacent to the Port Phillip Bay Ramsar site, have been a focus for traditional Aboriginal society for thousands of years. Many Aboriginal sites, particularly shell middens and artefact scatters have been recorded in the site. Further survey is likely to reveal more archaeological sites.

To date there has been limited consultation with the local Indigenous community. Further discussions need to take place in order to facilitate the management of Aboriginal cultural heritage. In particular, managers need to ensure that Aboriginal heritage values are not adversely impacted in the course of implementing other site management strategies.

4.6 Scenic

The character of the wetlands varies significantly between component sites. Most of the coastal wetlands present vistas of open water and marshland in comparatively pristine condition, although surrounding land is largely cleared and used for agriculture. In some towns (e.g. Queenscliff), older planted trees, such as Cypress and Norfolk Island Pine contribute to the post-European settlement character of the land surrounding the wetlands. At the Western Treatment Plant, expansive vistas of calm water on artificial lagoons reflect distant views of the You Yangs through stands of dead trees. The abundant and diverse bird life and distinctive communities of flora and fauna (both terrestrial and aquatic) add to the landscape character of the component sites.

4.7 Economic

The components, functions and attributes of the Port Phillip Bay Ramsar site provide a variety of direct and indirect economic benefits to the State.

Direct economic benefits from the use of natural resources in and around the Ramsar site include agriculture, fisheries, recreation and tourism.

Sewage treatment at the Western Treatment Plant provides an essential service for Melbourne, thus contributing to economic activity. The Western Treatment Plant also has a major livestock business running cattle and sheep within the boundary of the Ramsar site. The livestock are mainly used to manage pasture growth on land and grass filtration areas and are a source of income for Melbourne Water.

Adjacent to the southern end of Swan Bay, the Port of Queenscliff provides a regionally important tourism and boating node. Commercial tourism operations in Port Phillip Bay include fishing and boating in chartered vessels, as well as bird, seal and dolphin watching tours.

The wetlands and seagrass meadows of the inshore marine waters of the Ramsar wetlands of the Port Phillip Bay Ramsar site are important fish habitat and nursery areas that support a significant component of the commercial and recreational fishery of the bay. Commercial fishing operations occur adjacent to and on the shores of the bay in the vicinity of The Spit. Important recreational and commercial fishing grounds also occur off Kirk Point, Point Cook, Avalon Beach and Limeburners Bay.

The Government has accepted aquaculture zones at Point Lillias, Bates Point, Kirk Point-Werribee and Avalon, which were recommended by the Environment Conservation Council (ECC 2000). There has been significant investment in an aquaculture feasibility project at the Bates Point area and on land in and adjacent to the Ramsar site.

4.8 Education and interpretation

The Port Phillip Bay Ramsar site offers a wide range of opportunities for education and interpretation of wildlife, marine ecosystems, geomorphological processes and various assemblages of aquatic and terrestrial vegetation. The proximity of the component sites to both Melbourne and Geelong, and the scientific and marine education facilities at Queenscliff (e.g. the Marine and Freshwater Research Institute) make the site one of the most important in this respect.

Several public awareness activities are run annually within the Port Phillip Bay region. The City of Greater Geelong runs a corporately funded children's art competition to involve schools within the municipality.

Outstanding opportunities exist for the public to view large numbers of waterbirds in their natural environment. Interpretive tours are undertaken on a regular basis in the Western Treatment Plant and an access strategy is currently being prepared for this area to facilitate safe, controlled access for wildlife viewing. A wetland and bird viewing tower has been constructed at the southern end of the Cheetham Wetlands (near Point Cook), within the Ramsar site.

To promote interpretation, specific interpretation signs have been produced for each Ramsar site through the Victorian Ramsar interpretation project.

Due to the diversity, complexity and productivity of wetlands (all eight Victorian wetland types are represented in this site), they can be used to teach and demonstrate many of the scientific principles of ecology, biology, hydrology, chemistry, geology and geomorphology. Education can also provide an understanding of the fragility of wetland systems and how human activities can damage these systems.

Community education also plays an important role in the management of natural resources and in developing community support for management decisions.

4.9 Recreation and tourism

Situated close to both Melbourne and Geelong, the western shoreline of Port Phillip Bay and the Bellarine Peninsula are popular visitor destinations.

The main activities undertaken by visitors are recreational fishing, birdwatching, hunting, boating, swimming, sea kayaking, and camping. The range of recreational activities undertaken at the Port Phillip Bay Ramsar site is likely to increase as tourism opportunities are promoted. Activities offered by commercial operators in the surrounding area include fishing, horse riding, and pleasure tours (e.g. dolphin and seal tours). Charter boats operating out of Geelong and Queenscliff offer a variety of recreational activities.

The Western Treatment Plant and the Cheetham Wetlands near Point Cook have restricted access to minimise disturbance to waterbirds as well as for safety and security reasons.

4.10 Scientific

Birds Australia, the Australasian Wader Studies Group and the Victorian Wader Study Group use this site for long-term monitoring of waterbirds and

waders and have done so since the late 1970s. The sites that support the Orange-bellied Parrot have been monitored regularly since 1978 to determine population trends. This is the best data set on trends in the population of this critically endangered species.

Since 1988, Melbourne Water has funded a number of surveys of waterfowl utilising areas of the Western Treatment Plant. The most comprehensive of these surveys, undertaken by DSE from 2000 onwards, counts all waterfowl and migratory waterbirds at the site.

The marine habitats in Swan Bay are an important site for ecological research by Deakin University. Melbourne University and Melbourne Water have undertaken important research on the foreshore adjacent to the Western Treatment Plant on ecological changes in response to nutrient and organic enrichment of the marine environment.

There is also much potential for further scientific research in the Ramsar site. The site contains areas of all eight Victorian wetland types and is in close proximity to the Marine and Freshwater Research Institute at Queenscliff and universities in both Melbourne and Geelong.

There are five geomorphological sites of State significance within Port Phillip Bay Ramsar site described by Rosengren (1989) that are also visual attractions. The sites are:

- Mud Islands – Ridges and Lagoons;
- Hovells Creek – Mid Holocene sea level site;
- Limeburners Bay – Estuary;
- Point Wilson – Shell ridges; and
- Sand Hummocks – Barrier spits.

4.11 Condition

Vegetation

The Port Phillip Bay Ramsar site supports a high diversity of both artificial (secondary) and original wetland vegetation types.

Point Cook Coastal Park is a site of State botanical significance. It is the only reserve in the western region of Melbourne that contains examples of four vegetation types in proximity (dune vegetation, salt marsh, swamp and grassland).

The coast of the Western Treatment Plant north and south of the Murtcaim Drain has been negatively impacted from a combination of human access (Kirk Point), seepage of freshwater from adjacent sewerage lagoons and filtration paddocks, and rabbit grazing. The freshwater and rabbit impacts are monitored by Melbourne Water.

Limeburners Bay contains a zone of samphire saltmarsh broader than that which is commonly found in Victorian coastal marshes. Where spit deposits raise the level of the marsh, an assemblage of halophytes forms a low sward or type of saltmarsh meadow not as yet noted elsewhere in Victoria. Unlike most Victorian saltmarshes, there is no broad zone dominated by glasswort species. The largest stand of White Mangroves in Port Phillip Bay also occurs here, although it has been subject to limited dieback in recent years.

Lake Connewarre contains the most extensive example of *Wilsonia* herblands and *Distichlis* grassland in Victoria. Grey Glasswort and Tangled Lignum reach their southern limit within the Lake Connewarre Reserve and the White Mangrove reaches its westernmost limit in Victoria in the Barwon River estuary.

Reedy Lake supports the largest reed beds and seasonal sedgelands in the site. In the mid 1990s European Carp populations in the lake increased to the point where most of the aquatic vegetation in the lake was denuded. Water levels are now being actively managed to control carp and more closely resemble the natural, seasonal filling and drying cycle of the lake.

The saltmarshes of Swan Bay and Mud Islands are in very good condition, those at Swan Bay having improved since fencing to prevent stock access was completed. The dune vegetation of Mud Islands is subject to significant weed invasion due to the importation of weed propagules from the mainland by breeding Silver Gulls.

Water quality

Water quality in Port Phillip Bay is relatively good by world standards. In a study on the nutrient status of Port Phillip Bay it was noted that the concentration of nitrogen and chlorophyll in the waters of Port Phillip Bay is low when compared with other estuaries and embayments near major cities (Longmore et al. 1996). It is also noted that the nitrogen to phosphorus ratio is very low by world standards, light penetration is good and algal biomass is low, except in one or two locations (Longmore et al. 1996). However, the report states that the most sensitive indicator of the trophic state

of the Bay is not the water quality but the characteristics of the nutrient fluxes from the sediments. These are already adversely affected and Harris et al. (1996) recommend that the annual nitrogen load be reduced by 1000 tonnes.

Toxicants are not a threat to the overall health of the Bay at present with toxicant concentrations rarely exceeding guideline levels. However, variations in water quality do occur on a site by site and seasonal basis. Monitoring programs for Port Phillip Bay should therefore be designed to provide an early warning of adverse changes that may affect the water quality of the wetlands associated with the Port Phillip Bay Ramsar site.

The Western Treatment Plant Environment Improvement Plan addresses issues associated with sewage treatment and improvement in the quality of water discharged to the bay. Melbourne Water has commissioned and is finalising the 'Draft Ramsar and Conservation Management Plan - Western Treatment Plant. The Spit Nature Conservation Reserve and Adjacent Habitats' (Lane et al.1999) to address any impacts on Ramsar values, including waterbird habitat.

The Environmental Improvement Plan was referred to Environment Australia for consideration under the *Environment Protection and Biodiversity Conservation Act 1999*. Environment Australia has since approved the proposal subject to conditions which include preparing and implementing a Strategic Plan, and undertaking a regular independent audit every five years. The Strategic Plan is to include:

- studies to quantify the changes in nutrient balances in the lagoons and effect of changes on phytoplankton and other algae, zooplankton and birds;
- survey programs for birds and listed threatened species;
- benchmarks for populations of birds for guilds, internationally significant species and listed threatened species that will trigger the requirement for further mitigation measures to maintain suitable habitat;
- measures to manage habitat for the Warty Bell Frog;
- measures to refine the bird population viability model;
- measures to implement adaptive management of impacts from the action by reference to relevant plans and protocols; and
- protocols to inform the Minister of relevant issues, milestones, and results of surveys and studies.

Erosion

Some parts of the Port Phillip Bay Ramsar site are subject to natural erosion processes, or human-induced erosion due to vegetation disturbance. Coastal erosion is caused by changes in wave regimes at places like Point Cook and The Spit Nature Conservation Reserve. In the Barwon estuary and Lake Connewarre, localised river and lake bank erosion occurs due to trampling by pedestrians, and boat wake exacerbates this in places. While it is important to ensure erosion is not adversely affecting the Ramsar site, areas subject to erosion can provide open ground habitat favoured by some shorebirds.

The key risks to the environmental values in the Port Phillip Bay Ramsar site are discussed below and summarised in Table 5.1. The risks include altered water regimes, salinity, pollution, pest plants and animals, inappropriate resource utilisation, recreation and erosion. In many cases, the above risks were established prior to the listing of the site.

Risks result from activities in the wetland, on adjoining land and in the catchments. Protection of the site therefore requires an integrated approach. A wide variety of measures are being implemented in Port Phillip Bay to deal with risks. They include planning, research, site works, catchment works and education. A brief summary of these measures relevant to each risk is provided.

5.1 Altered water regimes

The catchment of Port Phillip Bay has been significantly altered since European settlement. The catchment supports Victoria's two largest cities, Melbourne and Geelong, with a combined population of more than 3.5 million people. The majority of the catchment has been cleared for either urban development or agricultural pursuits.

A significant proportion of Port Phillip Bay's catchment has been cleared and developed. This has fundamentally changed the hydrological characteristics of its watercourses by accelerating runoff, increasing local flooding and increasing catchment yield. These factors then impact on the Ramsar site by increasing the sediment load and levels of nutrients entering a number of the wetlands. This issue is of particular concern in the Barwon River Catchment, where water regimes have been altered not just due to catchment changes but due to water extraction. Flows down the Barwon and Moorabool Rivers are important to the health of Lake Connemara and associated wetlands, and to the availability of water for regulating levels in Reedy Lake.

The clearing of land and the increase in impermeable surfaces and stormwater drainage systems associated with urban development have decreased water infiltration rates and dramatically increased the speed of delivery of stormwater to creek and river systems. This represents a potentially significant risk at Reedy Lake, Limeburners Bay, southern Swan Bay and the lower Barwon River estuary and Lake Murtnagurt.

Stormwater is often contaminated by car washing detergents, fertilisers, oil from roads, grey-water

from unsewered areas, animal wastes (for example, dog faeces, and sometimes animal carcasses) as well as paints, lawn clippings, litter and other pollutants.

At the same time, drainage of stormwater into the wetland system provides supplementary water which can help compensate for water diverted out of the wetland system.

Barwon Water is currently investigating the use of ground water as a source of the Barwon region's fresh water supply. The effect of this proposal on the hydrology of the Ramsar site should be thoroughly investigated before any changes are made to the current water supply system.

The allocation of water in the Port Phillip Bay catchments is determined by processes of negotiating Bulk Entitlements (for regulated rivers), and Stream Flow Management Plans (for unregulated rivers). The objective is to control the rate of water extraction such that increasing demand for water is balanced with environmental health. Bulk Entitlements have been completed for the regulated reaches of the Barwon and Moorabool Rivers while streamflow management plans are underway for the unregulated reaches of these rivers.

The impacts of altered flows on the marine environment of Port Phillip Bay have not been well documented although the Port Phillip Bay Environmental Study, Harris et al. (1996) found that the Bay was in very good health in comparison with world standards. It should be noted that very little of this study was carried out close to shore (A. Longmore, pers. comm.).

The water regime of the Cheetham Wetlands (Point Cook) is totally dependent on the pumping of seawater from the estuary of Skeleton Creek. In the late 1980s, when the area was still managed as a saltworks, pumping and salt production were suspended for two years. By the second year, summer counts of waterbirds had declined by 85%. The resumption of pumping resulted in an immediate recovery in waterbird numbers (Australasian Wader Studies Group data).

The water regime in sewage treatment lagoons at the Western Treatment Plant is totally dependent on treatment processes and the management of these wetlands by Melbourne Water. On occasions lagoons have been drained (e.g. T-section lagoons) which temporarily increases the amount of shorebird habitat but reduces the habitat

available to other waterbirds. Current populations of both waterbirds and shorebirds are dependent on the management of these lagoons by Melbourne Water. Recycling of water sourced from the Western Treatment Plant, as proposed in the Werribee Plains: a vision for sustainable growth (NRE 2002e), has the potential to impact on the water regime of Ramsar wetlands.

Coastal beaches and spits are important roosting and, occasionally, breeding sites for coastal waterbirds (e.g. Pied Oystercatcher, Fairy Tern). Coastal engineering works (e.g. at Queenscliff) have in the past altered wave and beach sediment movement patterns. This can lead to the erosion of beaches and spits or the accumulation of beach material in new places.

Beach nesting and roosting birds are adapted to the natural dynamism of the coast, whereas engineering works have tended to stabilise the coast. Combined with high levels of human disturbance in many parts of Port Phillip Bay, this has reduced the habitat options for these birds.

Stabilisation of coastal areas promotes vegetation succession that covers bare, open areas preferred by these bird species. This has resulted in a reduction of breeding habitat for shorebirds, including a number of Tern species, raising concerns about the future of these species within Port Phillip Bay.

Plans and activities that have been undertaken to manage these risks are summarised below.

- The Corangamite Regional Catchment Strategy (Gunn 1997) and the bulk entitlement for the Barwon River are being implemented. Both measures will, or will continue to, provide direction to the management of flows in the Barwon River;
- A water level management plan has been developed by Parks Victoria in conjunction with Field and Game Australia for protecting and enhancing the values of Reedy Lake;
- Melbourne Water has adopted an adaptive management approach to the Environment Improvement Program and is implementing a series of detailed investigations to improve understanding of relationships, dependencies and biotic pathways for Ramsar values as well as monitoring those values;
- Melbourne Water has developed and implemented protocols for managing water regimes in shorebird conservation ponds.
- Pumping by Parks Victoria to maintain waterbird habitats in the Cheetham Wetlands (Point Cook) occurs on a routine basis; and

- Fairy Tern breeding habitat on The Spit Nature Conservation Reserve is being restored and maintained by the Victorian Wader Study Group and Parks Victoria.

5.2 Salinity

Port Phillip Bay's Ramsar wetlands are mostly naturally saline, with catchment related salinity of waterways representing a minor risk.

The exception is localised salinity within the Barwon catchment that contributes increased salt loads to the river. Excessive salt in water delivered to the lower Barwon wetlands could result in significant changes in the ecological characteristics of the freshwater sections of these wetlands.

The Corangamite Regional Catchment Strategy includes actions designed to manage diffuse saline discharge from the catchment to the Barwon River.

5.3 Pollution

The main sources of pollutants to Port Phillip Bay are from sewage discharge points (point sources) at the Western Treatment Plant and from stormwater drains (diffuse sources). Approximately 54% of Melbourne's sewerage is treated to a secondary level at the Western Treatment Plant before being deposited into Port Phillip Bay via four drains. Upgrades to the Western Treatment Plant will reduce the levels of nitrogen being deposited into Port Phillip Bay by approximately 500 tonnes per year. Melbourne Water has put in place a monitoring and investigation program and has adopted an adaptive management approach to address any environmental impacts.

Stormwater is a major contributor of litter, oils and heavy metals to Port Phillip Bay. The areas where stormwater represents a potential risk to the Port Phillip Bay Ramsar site are Limeburners Bay, Reedy Lake and southern Swan Bay. In the Queenscliff and Point Lonsdale areas, the sewerage system has leaked a number of times and untreated sewage has flowed into the southern part of Swan Bay without detection. Such wastes have the potential to elevate nutrient levels and reduce water clarity in southern Swan Bay.

Diffuse source pollution, carried in runoff from the catchment, occurs during high rainfall events. High quantities of agricultural runoff containing pollutants such as biocides, sediments and nutrients and other diffuse source pollutants can find their way into the marine environment, particularly at Swan Bay and potentially at Lake Connemara and Reedy Lake. Both the Werribee and Barwon Rivers are affected by agriculturally

derived pollution. The Barwon River has recently experienced blue-green algal blooms, indicating that nutrient and flow conditions are reaching critical levels.

Pumping water into the Cheetham Wetlands during times of high freshwater flows may also result in sediment and nutrient pollution from stormwater. Concern has been raised that leachate from the Altona tip may affect the Cheetham Wetlands.

Spills of oil, fuels and lubricants (from urban and industrial areas, the Ports of Geelong and Queenscliff, accidents or disposal of ships' wastes) could have serious implications on the natural values of the Port Phillip Bay Ramsar site. The spilt substance and/or the clean-up techniques used have the potential to cause damage or death to aquatic organisms, wildlife and essential habitat such as feeding and nursery areas. The areas exposed during low tide, especially muddy intertidal areas, and mangrove and saltmarsh communities, are vulnerable to oil or chemical spills.

The Victorian Marine Pollution Contingency Plan has been prepared to counter major oil spills in Victoria (VMPC 1997). A corresponding plan has been prepared for the Port Phillip Bay Region (including the coastline from Cape Otway to Cape Schank) (VCA 1999). Marine pollution plans are also prepared for all ports with the Port Phillip Bay region.

Litter is not only aesthetically unpleasing, but has the potential to kill wildlife. Plastic litter is particularly problematic, as wildlife (including waterbirds and marine mammals) sometimes consume or become entangled in it. Stormwater drains, particularly from urban areas, are a possible source of litter, as is disposal of rubbish by boat users into Port Phillip Bay. Discarded fishing line and other litter associated with recreational and commercial fishing can also pose a significant risk to wildlife. Strategies to minimise the impact of litter in Port Phillip Bay should be investigated.

Chemical control of mosquitoes is carried out using larvicides within the Ramsar site. Large numbers of mosquitoes pose a risk to human health via the transmission of mosquito-borne diseases and also impact on amenity and well-being. The effects of chemical mosquito control on the wetlands system is not fully understood and requires further investigation.

Implementation of the State Environment Protection Policy – Waters of Victoria: Waters of Port Phillip Bay will contribute to reducing the risk

of significant water pollution that affects the Ramsar wetlands of the bay. Melbourne Water has developed an adaptive management framework for managing the potential impact on Ramsar values of reduced nutrient loads to the bay. Implementation of this will enable the effects to be monitored and appropriate responses to be determined.

The City of Greater Geelong is developing a Stormwater Management Plan which is likely to assist significantly in directing resources to key stormwater problems, particularly where these currently or potentially affect the Barwon River and Ramsar wetlands. As part of this initiative, a number of gross pollutant traps have been installed. The implementation of the Corangamite Regional Catchment Strategy will contribute to reducing the risk of catchment derived sediment and nutrient pollution of the Barwon River. A Nutrient Management Plan has recently been completed for the Werribee River (PPCALPB 2002).

The Port Phillip Bay Environmental Management Plan (NRE 2002b, NRE 2002c) outlines plans and critical programs to address environmental issues such as pollution within Port Phillip Bay.

5.4 Dredging

Sand bypass dredging at the Port of Queenscliff is a continuous operation to keep the port open to vessels, particularly the Queenscliff to Sorrento Vehicular Ferry. Dredge spoil from this area has been dumped to the north of the port where it has been entrained by local wave action and continues to move in a northerly direction. This is one of the largest dredging operations on the Victorian coast. Dredging has the potential to pollute waterways by increasing suspended sediment, reducing water clarity, smothering sensitive seagrass communities and changing tidal regimes. However, the impacts of dredging in Port Phillip Bay are minimised by adhering to the best practice guidelines for dredging produced by the EPA (2001).

The Victorian Channels Authority is currently considering a major strategic project to deepen the shipping channel within Port Phillip Bay. This project would involve dredging some of the major shipping routes within the Bay. An Environmental Effects Statement, which is accredited under the *Environment Protection and Biodiversity Conservation Act 1999* (Cwlth), is being prepared to examine the environmental impact associated with deepening the shipping channels within the Bay and will be used as a guide in the decision making process.

5.5 Pest plants and animals

Pest plants

Introduced plant species occurring within the Port Phillip Bay Ramsar site make up about 24% (93 species) of the flora of the area. Many of these species have the potential to become environmental weeds, therefore posing a serious threat to the site's values. If not controlled, pest plants may dramatically alter the structure and composition of remaining native plant communities, potentially leading to a loss of indigenous plant species and changes in habitat characteristics for indigenous fauna.

'Environmental' weeds are exotic plants that invade native vegetation, adversely affecting the survival of the indigenous flora (Carr et al. 1992). The most serious environmental weed species of coastal vegetation communities include African Boxthorn, Serrated Tussock, Artichoke Thistle, Spiny Rush, Fennel, Gorse, Pampas Grass, Flax-leaf Broom, Italian Buckthorn and Mirror Bush.

Investigations of weed problems in areas of conservation significance in the Western Treatment Plant have identified Spiny Rush as the most significant threat to conservation values and a control program was carried out during 2000. Boxthorn is a particular threat to the integrity of coastal vegetation communities at Point Cook.

Spartina grows in marine intertidal areas subject to regular or occasional freshwater influence. *Spartina* invasion is a listed threatening process under the *Flora and Fauna Guarantee Act 1988* and has been listed as a noxious aquatic species under the *Fisheries Act 1995*. There are infestations in Lake Connemare and the lower Barwon estuary. *Spartina* is known to seriously degrade habitats for waterbirds, particularly shorebirds, by occupying and rendering both feeding and roosting areas unsuitable (Lane 1991).

Parks Victoria has implemented ongoing monitoring and control programs for Boxthorn and Serrated Tussock at the Cheetham Wetlands and The Spit, and of *Spartina* in the Barwon estuary and Lake Connemare. Melbourne Water has developed and is implementing a priority weed control program in areas of high conservation value in the Western Treatment Plant.

Tall Wheatgrass is an environmental weed that tolerates saline conditions. This species has been used to assist in rehabilitating saline land near the Hovells Creek area but there are concerns that this weed could invade the naturally saline wetlands closer to the coast. The use of a native saltmarsh complex to assist in regenerating saline lands

should be investigated as a safer alternative to the use of Tall Wheatgrass.

Pest animals

Introduced pest animals are widespread at all Victorian Ramsar sites, including the Port Phillip Bay Ramsar site. Introduced animals known to be present at the Port Phillip Bay site include black rats, brown rats, house mice, starlings, sparrows, blackbirds, mynas, rabbits, foxes, brown hares, feral cats, domestic dogs and carp (NRE 2000).

Rats, mice and rabbits compete with small native mammals for food and habitat space. Rabbits, in particular, thin ground cover, reducing the suitability of vegetation for native ground-dwelling fauna. They also prevent regeneration of native species and encourage some weed species. Rabbit burrows often initiate more extensive wind or water erosion, particularly in slightly steeper dune country. Feral cats and, near residential estates, domestic cats, are known to disturb and prey on native wildlife. Dogs exercised off leads can also disturb birds.

Rabbits are considered to be widespread throughout the Ramsar site. Their grazing reduces food supplies in saltmarshes throughout Port Phillip Bay for the critically endangered Orange-bellied Parrot. It has also promoted weed invasion around the margins of wetlands at The Spit, Reedy Lake, Lake Connemare and Swan Bay.

Foxes are particularly abundant around Port Phillip Bay and the view of land managers is that current levels of control are not effective. The presence of the fox in Ramsar wetlands contributes to the recurring mortality of waterbirds, particularly during the moulting season when many ducks are flightless (e.g. at the Western Treatment Plant). It is also likely that fox predation at roost sites may be contributing to a decline in the numbers of Orange-bellied Parrots using The Spit area (Lane et al. 1999). Fox population levels at the Western Treatment Plant are relatively high.

Feral cats occur in all components of the Port Phillip Bay Ramsar site. The impact of wandering domestic cats is an added risk at a number of areas, including Cheetham Wetlands (Point Cook), Lake Connemare and the lower Barwon estuary (near Barwon Heads and Ocean Grove), the southern shores of Swan Bay and at Limeburners Bay.

The *Domestic (Feral and Nuisance) Animals Act 1996* enables local councils to restrict the presence of cats and dogs on public areas. The Queenscliffe Borough has introduced restrictions on cats and dogs within their jurisdiction and other

local councils within and around the Ramsar site should consider exercising the strictest options available under the Act.

Although not strictly considered to be a pest species, the Silver Gull has increased dramatically in numbers in recent decades around Port Phillip Bay. It has established a very large breeding colony on Mud Islands, numbering tens of thousands of breeding pairs. The impact of Silver Gulls on other birds at Mud Islands is not fully understood but they are thought to be responsible for the reduced breeding success of Fairy Tern and White-faced Storm Petrel. Silver Gulls are also thought to have a negative impact on populations of Caspian Terns within the Ramsar site through increased predation of eggs and chicks. Silver Gulls also carry propagules of weeds to the island.

Routine rabbit and fox control occurs at the Western Treatment Plant (Melbourne Water), The Spit Nature Conservation Reserve and at the Cheetham Wetlands (Parks Victoria). Fox control programs are being stepped up at The Spit and are ongoing at the Cheetham Wetlands. A predator-proof fence has been constricted around all saltmarsh areas in the Point Wilson Explosives Area. No targeted feral cat control programs are underway, although DPI is currently researching control technologies. Domestic cat threats to wildlife have been highlighted in a leaflet on responsible pet ownership prepared by the former NRE, although no coordinated approach to the problem at particular sites in Port Phillip Bay has been implemented.

Carp occur in some areas of this Ramsar site including the Lake Connewarre State Game Reserve. Carp are considered a noxious fish in Victoria due to the ecological and environmental problems they cause when present in high densities. The feeding strategy of carp can result in increased water turbidity and the destruction of submerged aquatic vegetation that provide food and shelter for native fishes and waterbirds (Barnham 1998). Reedy Lake has been included in the Victorian Carp Assessment and Research Project (VicCARP) which incorporates control works being carried out by Geelong Field and Game.

Intertidal and marine pests

Marine pests are a systemic risk to Victorian marine waters and actions on the risks to the Port Phillip Bay Ramsar site are assessed and acted on in this context. Action on the systemic risk is outlined in the *Flora and Fauna Guarantee 1988* 'Action Statement – Introduction of Exotic organisms into Victorian Marine Waters'. This

approach gives priority to reducing the risk of further introductions of marine pests – key actions include the development of a ballast Water Management System and associated Industrial Waste policy (Ships' Ballast Water and Hull Cleaning). The Action Statement also calls for a rapid response in the event of a marine pest introduction and this is detailed in Interim Victorian Protocol for Managing Marine Organism Incursions (NRE, 1999).

The Northern Pacific Seastar and the Sabellid Fan Worm are two of the marine pests that can be found in Port Phillip Bay. These species are thought to have been introduced to Australian waters through ballast-water and both have the potential to have major ecological and economic impacts (ANZECC 1995).

5.6 Resource utilisation

The annual commercial fishing catch has fallen sharply in Port Phillip Bay in recent years from a high of over 2,600 tonnes in both 1992-93 and 1993-94 to around 700 tonnes each year from 1998/99 to 2001/02 (NRE 2002f). Most variation in the total catch has been due to wide fluctuations in Pilchard catches with other commercial species remaining relatively stable. Few commercial fishing activities occur within the Ramsar sites so this activity therefore does not pose a serious threat to Ramsar values.

During the early 1980s and into the 1990s there is thought to have been a considerable increase in recreational fishing effort through changes in technology (e.g. depth sounders) and greater numbers of fishers in Port Phillip Bay. This has led to increased fishing effort and greater pressure being placed on fish stocks. While there is comprehensive data on commercial fish catches over a long period, there have been few estimates of the recreational catch from major waters in Victoria

The potential impact of recreational fishing on Ramsar values relates more to uncontrolled or unmanaged access to fishing locations either by land or by water. Boats that approach too close to feeding or roosting areas may disturb birds, and people fishing from the shoreline may trample and destroy fragile coastal and wetland vegetation. Disturbance of waterbirds is a problem in southern Swan Bay and along the Avalon foreshore and Limeburners Bay. Disturbance to breeding birds from fishermen at Mud Islands is a potential problem, but little information on the extent or impacts of this is available. A buffer zone around Point Abeona, which would exclude boating in order to protect waterbirds, has been proposed in

the Draft Limeburners Bay Management Plan.

Trampling of coastal vegetation is a particular problem on the Barwon estuary and Lake Connewarre.

Despite it being illegal, exploitation of intertidal marine organisms, particularly abalone and sea urchins, occurs on the rocky reefs of Point Cooke and The Spit Nature Conservation Reserve (south of Little River and around Kirk Point). The impacts of this exploitation are not known.

The Victorian Government has accepted the ECC recommendations for aquaculture zones (ECC 2000) including zones at Point Lillias, Avalon, Kirk Point and Bates Point. These require a management plan for each aquaculture area, provisions for translocation of live aquatic organisms, research and monitoring and certifying of supplementary foods. Potential impacts associated with aquaculture include:

- altered coastal foreshores;
- increased local nutrients from waste production;
- introduction of exotic organisms and disease through transfer of equipment and stock;
- reduced visual amenity due to the use of rafts, cages and other equipment; and
- impacts of chemicals and antibiotics to control diseases.

Duck hunting occurs in the Lake Connewarre State Game Reserve during the duck open season. DSE and Parks Victoria manage this activity under strict guidelines and enforcement codes. Access by shooters to parts of the reserve result in trampling of vegetation, although this is not considered to be a widespread problem. Part of the reserve, which provides critical habitat for the Orange-bellied Parrot, has been classified as a Nature Conservation Reserve under the *Wildlife Act 1975* and game hunting is not permitted.

Contamination of wetlands from the accumulation of lead shot is listed as a threatening process under the *Flora and Fauna Guarantee Act 1988* (NRE 2002a). Lead shot was prohibited for duck hunting in Victoria in 2002 but can still be used for hunting quail, pest animals and for clay target shooting. Waterbirds, which feed in or on the edges of wetlands, are still at risk of lead poisoning due to residual lead in sediments (FFG Action Statement No.32). The extent of the lead contamination in Lake Connewarre Game Reserve is not known.

Duck hunting is strictly controlled by DSE and at

the Lake Connewarre State Game Reserve the season is regularly overseen by officers of DSE and Parks Victoria.

Fisheries regulations such as licence limitation, bag limits, catch quotas, size limits, gear restrictions and seasonal or area closures are imposed to provide for the ecologically sustainable development of the State's fisheries resources. It is unlikely that any single management measure will produce the desired stock conservation results, and a combination of several regimes is often used to allow resource use but also prevent overfishing.

Grazing

Grazing and trampling by domestic animals is generally not compatible with the conservation of Ramsar sites. Grazing directly causes a reduction in the vegetation cover by foraging and physical damage. This creates localised areas of bare soil that can lead to significant changes in the composition of vegetation communities, including extensive weed invasion (e.g. Carr & Kinhill Planners 1979).

Stock grazing close to waterways and wetlands can increase runoff and reduce water quality, causing muddying and fouling of the water, resulting in increased turbidity and nutrient levels and depleted oxygen levels. This results in a loss of freshwater biodiversity. Nevertheless, controlled grazing can sometimes be used successfully as a management tool to meet ecological objectives.

Stock grazing within the Ramsar site is restricted to cattle and sheep grazing within the irrigated pastures in the Western Treatment Plant. There is also debate as to whether grazing should be reintroduced into the saltmarsh in part of The Spit to improve the habitat for the Orange-bellied Parrot to promote greater seed production in the bird's food plants.

Management measures that have been taken to prevent damaging grazing include: the fencing of the foreshore of Swan Bay and management areas at Western Treatment Plant; and consideration of an investigation and grazing trials for Orange-bellied Parrot habitat at The Spit.

Commercial development

The residential development in the area of the Ramsar site north of the Maltby Bypass near Werribee has the potential to negatively impact on the values of the Ramsar site. A large proportion of the Ramsar site north of the Werribee Treatment Plant has relatively low ecological value in comparison with other areas of the site and is separated from the rest of the Ramsar site by a

freeway. Potential impact from residential and commercial development in the area include: urban runoff contributing to the pollution of the Werribee River, and the risk of domestic animals becoming feral and impacting on the site by moving down the Werribee River corridor.

The current master planning process for Avalon Airport will provide the basis for establishing future use or development at the airport. The Victorian Government is liaising with the Commonwealth Department of Defence and the airport leaseholder regarding future developments and environmental safeguards, including protection of Ramsar values.

To help protect the values of the Port Phillip Bay Ramsar site planning for any future development of the area must take into consideration the conservation and wise use objectives that are an obligation under the Ramsar Convention. The City of Greater Geelong has taken active steps by developing an Environmental Significance Overlay, which provides some protection for significant wetlands within its jurisdiction. Issues associated with urban stormwater run-off are being addressed by the Environment Protection Authority (EPA) in the Victorian Stormwater Action Program (VSAP) and the State Environment Protection Policy (Waters of Victoria) currently being revised. The EPA is placing a key focus on improving stormwater quality over the next ten years.

5.7 Recreation

Recreational activities have both positive and negative consequences for the values of the Port Phillip Bay Ramsar site. Recreational enjoyment of the amenity and natural values of the area contributes to increased awareness of these values. In turn, this can lead to greater community support for effective programs to maintain the ecological character of the area. Finding the right balance between human access and disturbance to Ramsar values is of particular significance in Port Phillip Bay due to the large nearby human population.

At present, the main visitor impacts are associated with fishing and recreational boating. People fishing from the shoreline cause damage to wetland vegetation and this is a particular problem at Lake Connewarre and the lower Barwon estuary. Bait collection has been identified as having a negative impact on foreshore environments in the Ramsar site by the Western Treatment Plant Wildlife Consultative Committee.

Disturbance of waterbirds and other wildlife by people is becoming an increasing problem where urban areas have spread to the edge of Ramsar

wetlands in Port Phillip Bay. Areas where urban pressures have become a particular problem include the Cheetham Wetlands (Point Cook), Lake Connewarre and the lower Barwon estuary, the southern part of Swan Bay and Limeburners Bay. The same areas, along with Kirk Point in The Spit Nature Conservation Reserve, are also subject to regular disturbance by Off-Road Vehicles, including trail bikes and 4WD cars.

Birdwatching is a significant activity in some parts of the Ramsar sites and poses potential management risks related to waterbird disturbance, damage to sensitive habitats, human safety and access to prohibited areas.

Personal watercraft and wind-surfers disturb roosting, feeding or breeding waterbirds (Collins et al. 2000). This has become a problem at Cheetham Wetlands (Point Cook), The Spit, along the coast of the Western Treatment Plant and in Swan Bay. Jet-skiers regularly cross to Mud Islands to access the lagoon there, resulting in significant disturbance to feeding, roosting and breeding birds. No legal mechanism currently exists for regulating the use of personal watercraft in areas of nature conservation significance.

According to Martindale (1982), disturbance of roosts will displace populations elsewhere and have several undesirable consequences, including:

- removal of birds further from their feeding grounds, which may result in mortality, especially among migrating species;
- inadequate roosts to accommodate larger populations at other locations, resulting in increased competition and mortality; and
- loss of species that are highly specialised and adapted to particular areas of the Inlet, which will likely be out competed by generalist species.

Disturbance by visitors to Mud Islands during the breeding season may additionally pose a threat to the survival of breeding species such as the Crested Tern and Pied Oystercatcher, and to breeding threatened species, including the Caspian Tern.

Parks Victoria and Melbourne Water have prepared management plans for some of the areas in the Ramsar site they manage and these include measures to balance recreational disturbance and wildlife conservation. The plans do not cover the entire Ramsar site.

In areas where urban development occurs adjacent to the Ramsar site, some measures have been taken to manage access. At the Cheetham

Wetlands, a moat is to be constructed on the inland side of the wetlands to limit human and vehicular access. Melbourne Water is currently preparing an access plan for the Western Treatment Plant. Access is strictly controlled at The Spit Nature Conservation Reserve, Point Wilson Explosives area, Avalon Saltworks and Swan Island and is carefully managed at the Lake Connewarre State Game Reserve in accordance with recommendations in the 1993 management plan. Access to Mud Islands is currently difficult to control. Parks Victoria and the City of Greater Geelong are collaborating to prepare a management plan for Limeburners Bay, a significant aspect of which is to bring human access under greater control.

5.8 Erosion

Erosion is a natural process in dynamic environments; however, erosion rates can be accelerated by human interference.

Coastal erosion in Port Phillip is due to a combination of wind and wave action, with the western coastline a lower energy environment. The risk of erosion can be reduced by maintaining vegetative cover such as mangroves and saltmarsh to bind and protect the soil from wind and waves. Coastal erosion is a potential risk to Ramsar values at:

- The Barwon River (which may be exacerbated by the destruction of the protective fringing mangroves); and
- The Port Phillip Bay coast between Limeburners Bay and Werribee (this is probably due to natural coastal processes)

Erosion from catchment based activities can also be a significant risk to the environmental values of the Ramsar site. Catchment based erosion can deliver sediments, nutrients and toxicants to the Ramsar site, decreasing water quality.

Erosion problems associated with recreational activities are discussed in Section 5.6.

Management plans have been prepared for Cheetham Wetlands and the Lake Connewarre State Game Reserve and are in preparation for Limeburners Bay and Avalon Beach. These plans propose measures for controlling and preventing erosion through access control measures and the provision of infrastructure where human use is most frequent. The Corangamite Catchment Management Plan provides directions on the control and prevention of erosion in the catchment of the Barwon River through a range of measures,

including the identification of areas subject to accelerated soil erosion and the investigation of appropriate erosion control methods.

5.9 Level of risk to Ramsar values

The goal of the integrated management framework (incorporating the Strategic Directions Statement and corresponding Strategic Management Plans) is to facilitate the maintenance of ecological character at Victoria's Ramsar sites by minimising risks to values. This objective will be achieved through the implementation of strategically prioritised management actions. The proposed management actions are prioritised according to their ability to address the identified threats or risks.

A *strategic risk assessment* process based on the broad concepts and principles of ecological risk assessment has been undertaken for the Strategic Directions Statement and Strategic Management Plans (NRE 2002d – Appendix 7). This process relied on a clear understanding of the range of direct and indirect pressures facing the wetlands, as well as the legislative and policy context.

A systematic and strategic analysis of risk provides the necessary information to site managers; and facilitates priority setting, resource allocation and informed decision-making. It also provides a better understanding of management issues.

The strategic risk assessment process has established the basis for objectively assigning higher, medium and lower priority levels to risks at Ramsar sites and the management actions designed to address them. The strategic risk assessment approach also facilitates an understanding of the relationship between specific risks and values. The strategic risk assessment framework draws on two major relevant documents: the US Environment Protection Authority's Guidelines for Ecological Risk Assessment (USEPA 1997), and the Ramsar Convention's Wetland Risk Assessment (Ramsar Convention Bureau 1999).

The main risks to the environmental values and ecological character of the Port Phillip Bay Ramsar site are summarised below in Table 5.1. It should be noted that the level of risk has not been assessed against the effort currently being applied to mitigating the risk. Based on our current understanding altered water regimes, pollution, pest plants, pest animals and recreation and tourism are considered the most serious threat to the site's environmental values and ecological character.

Table 5.1 Level of risk to the ecological character of the Port Phillip Bay Ramsar site

	Risks							
	Altered water regime	Salinity	Grazing	Pollution	Pest plants and animals	Resource Utilisation	Recreation & Tourism	Erosion
Point Cook	◆			◆◆	◆◆	◆	◆◆	
Western Treatment Plant	◆◆◆		◆	◆◆	◆◆	◆	◆	◆
The Spit Nature Conservation Reserve	◆◆			◆	◆◆◆	◆		◆
Point Wilson - Limeburners Bay				◆◆	◆◆	◆◆	◆◆	◆
Swan Bay			◆	◆◆	◆◆	◆	◆◆	◆
Mud Islands				◆◆	◆	◆	◆◆	◆
Lake Connewarre State Game Reserve	◆◆◆	◆◆	◆◆	◆◆	◆◆◆	◆	◆◆	◆◆
Ramsar site	◆◆	◆	◆	◆◆	◆◆	◆	◆◆	◆

◆◆◆ **Higher priority risk** – risks that currently or may potentially result in the significant loss of the site's environmental values and ecological character.

◆◆ **Medium priority risk** – risks that currently or may potentially result in the moderate loss of the site's environmental values and ecological character.

◆ **Lower priority risk** – risks that currently or may potentially result in the minor loss of the site's environmental values and ecological character.

6 Site Management Strategies

Site Management Strategies have been developed in response to the analysis of risks to the values at the Port Phillip Bay Ramsar site. The Site Management Strategies are grouped under the relevant Management Objectives established by the Strategic Directions Statement.

The Site Management Strategies for the Port Phillip Bay Ramsar are designed to:

- a) promote a range of specific management actions that will maintain, and in some cases promote, the restoration of the ecological character of the area;
- b) deal with risks to the site values that have a high priority for attention;
- c) have regard to ongoing efforts required to maintain the ecological character of the Ramsar site; and
- d) emphasise and strengthen existing requirements for sustainable use.

The successful coordination and cooperation of the lead agencies as well as the continued efforts of the many community and interest groups, is essential for the long-term conservation of the Port Phillip Bay Ramsar site. The Strategic Directions Statement, statutory mechanisms, management plans and management strategies will guide the implementation of this Strategic Management Plan.

DSE will have overall responsibility for:

- facilitating the implementation of the Strategic Directions Statement and Strategic Management Plans for Ramsar sites by ensuring relevant agencies incorporate relevant strategies into their work programs;
- coordinating and reporting on the progress and/or issues with implementation of the Strategic Directions Statement and Strategic Management Plans for Ramsar sites;
- ensuring monitoring programs are established in accordance with the Strategic Directions Statement and Strategic Management Plans for Ramsar sites;

- ensuring the regular review of Strategic Management Plans for Ramsar sites;
- preparing the Victorian chapter of Australia's National Report to triennial Conferences of the Contracting Parties to the Ramsar Convention; and
- the six yearly update of the Ramsar Information Sheets for each site.

In order to clarify accountabilities, the lead agency responsible for the implementation of each strategy is identified. Lead agencies will monitor implementation of the strategies for which they are responsible. Lead agencies are encouraged to record progress on their responsibilities and extent of implementation and provide information in the form of annual summary reports to DSE. This information will be consistent with a format to be developed by DSE and will contribute to Victoria's chapter in the National Report to the Convention on Wetlands, prepared every three years.

A rating of relative priority accompanies each Site Management Strategy. Definitions of these priorities are as follows:

Higher: Strategies that, when implemented, will significantly contribute to the maintenance of ecological character.

Medium: Strategies that, when implemented in conjunction with Higher priority strategies, will support the maintenance and contribute to the restoration of ecological character.

Lower: Strategies that, when implemented in conjunction with Higher and Medium priority strategies, will result in enhancement of ecological character.

Management Objective 1

Increase the scientific understanding of wetland ecosystems and their management requirements

	Site Management Strategy	Lead agency	Priority
1.1	Support and promote environmental research in the Ramsar site by accredited research and education organisations (including community groups and tertiary education institutions) and encourage research directly relevant to management priorities taking account of the priorities in Appendix 3.	EPA, MW, DSE, PV, SRW, Councils	Higher
1.2	Investigate the causes of dieback amongst mangroves in Limeburners Bay	DSE	Medium

Management Objective 2

Maintain or seek to restore appropriate water regimes

	Site Management Strategy	Lead agency	Priority
2.1	Implement the Barwon River Bulk Entitlement and negotiate for flows to be provided in Stream Flow Management Plans for the Barwon and Moorabool Rivers to protect Reedy Lake and the other lower Barwon River wetlands.	DSE, BW, CCMA, SRW	Higher
2.2	Ensure that new water developments consider and provide for protection of Ramsar values, in particular projects involving water recycling and changes to sewage treatment at the Western Treatment Plant.	DSE, MW, BW, CCMA	Higher
2.3	Implement the adaptive management strategy described in the Western Treatment Plant and Spit Wildlife Reserve Conservation Management and Action Plan (July 2000) for monitoring and managing the impact of changes in sewerage lagoon operations on waterbirds.	MW	Higher
2.4	Document and continue to implement a hydrological management plan for the Cheetham Wetlands that includes all waterbirds' habitat requirements.	PV	Higher
2.5	Implement the water level management plan for Reedy Lake developed by Parks Victoria.	PV	Higher
2.6	Seek to restore an appropriate water regime for Ryans Swamp in the Western Treatment Plant.	MW	Higher
2.7	Ensure future coastal development has minimal impact on coastal hydrodynamic characteristics and associated features and habitats.	DSE, PV, Toll Geelong, MPC, VCA, MW, Defence, Councils, CCB	Higher
2.8	Implement actions in the Corangamite Regional Catchment Strategy to protect water quality and flows in the Barwon River.	CCMA, BW	Higher
2.9	Support the development of stormwater management plans for urban areas adjacent to or near the Ramsar site incorporating the principles of water-sensitive urban design and flow retention.	MW, EPA, CoGG, BoQ, WCC	Medium
2.10	Ensure regular monitoring of the effects of the drainage scheme of the Point Cook Estate on Skeleton Creek and the Cheetham Wetlands within the Ramsar site.	PV, WCC	Medium
2.11	Develop a hydrological management plan for Lake Connemara that takes into account natural water flows and the health of the whole river-wetland ecosystem.	PV, BW, CCMA	Medium
2.12	Liaise with Cheetham Salt to investigate possibilities to improve water flows for shorebirds in the north and south parts of the Avalon Saltworks to complement the Ramsar site.	DSE	Lower

Management Objective 3

Address adverse processes and activities

	Site Management Strategy	Lead agency	Priority
3.1	Develop and implement plans to eradicate or limit the spread of pest plants and pest animals (primarily foxes and rabbits) in key areas.	DPI, PV, MW, Councils, Defence	Higher
3.2	Continue to monitor the extent of Spartina invasion within the Ramsar site and maintain programs to reduce the extent of invasions.	DSE, PV	Higher
3.3	Ensure that the provisions of the EPA's 'Draft Best Practice Management Guidelines for Dredging' are strictly adhered to during the planning and execution of all dredging operations in Port Phillip Bay.	PV, Toll Geelong, VCA, EPA	Higher
3.4	Take all precautions to avoid accidental and deliberate oil and other chemical spills into the bay - including enforcing legislation.	EPA, MSV, Toll Geelong, MPC, PV, VCA	Higher
3.5	Ensure proponents are aware that development proposals that may impact on Ramsar values should be referred to Environment Australia or an approved State authority as directed by the EPBC Act 1999.	DSE, PV, CMAs, Councils	Higher
3.6	Extend coverage of oil spill response plans to all parts of the Port Phillip Bay Ramsar site.	DSE, PV, Toll Geelong & MPC, VCA, MSV	Higher
3.7	Maintain current or higher levels of fox and rabbit control around all Port Phillip Bay Ramsar site areas in cooperation with private landowners.	DPI, PV, MW	Higher
3.8	Upgrade and ensure the safe operation of sewerage in Queenscliff and Point Lonsdale to prevent further spills into southern Swan Bay and develop a protocol for rapid response to leakages.	BW, EPA, DSE	Higher
3.9	Seek to prevent and control the introduction of marine pest plant and animal species and implement the Victorian Protocol for Managing Marine Organism Incursions.	DSE, VCA, MSV, EPA, MPC	Higher
3.10	Manage and control human access to minimise disturbance at waterbird and seabird breeding colonies in the Port Phillip Bay Ramsar site during the breeding season.	PV, MW	Higher
3.11	Examine options to regulate boating activities in or adjoining sensitive habitats.	DSE, PV, MSV	Higher
3.12	Educate the general public of the risks to Ramsar bird species associated with disturbance (e.g. walking, horse riding, exercising dogs).	DSE, PV, Councils	Higher
3.13	Develop and implement planning controls for Ramsar wetlands and adjacent wetland areas to ensure that land use and development does not significantly impact on Ramsar values.	DSE, Councils	Higher
3.14	Minimise disturbance to roosting and feeding shorebirds during the duck hunting season at the Lake Connewarre system.	PV, DSE	Higher
3.15	Continue the ban on water-skiing and jet skis in the Lake Connewarre State Game Reserve and extend the ban to the south-east and east sides of the lake adjacent to important shorebird feeding sites.	PV	Higher
3.16	Minimise pollution of Swan Bay from town wastewater discharge and agricultural runoff, for example using planning controls, EPA licences or stormwater management/nutrient management plans.	DSE, CoGG, BoQ, CCMA	Higher
3.17	Discourage dog and vehicle access to Edwards Point to reduce disturbance to shorebird roosts and feeding habitat.	DSE, PV	Higher
3.18	Enforce speed restrictions and ban use of jet skis in Swan Bay and Mud Islands to minimise disturbance to feeding and roosting shorebirds.	PV, DSE	Medium
3.19	Fence areas where grazing is damaging wetland vegetation and habitat.	DSE, PV	Medium
3.20	Minimise disturbance by boating, fishing, walking and vehicle use to shorebird roosts and feeding areas in the Barwon estuary through signposting at access points and boat ramps and education aimed at user groups.	PV, BW, CoGG, BCCM	Medium
3.21	Develop and implement measures to control carp within the Barwon River, Reedy Swamp and Hospital Swamp.	DSE, PV	Medium
3.22	Discourage landing on Mud Islands and boating in the lagoon.	PV	Lower

Management Objective 4

Manage within an integrated catchment framework

	Site Management Strategy	Lead agency	Priority
4.1	Implement strategies and initiatives in the State Environmental Protection Policy (EPA 1997) and Corangamite Regional Catchment Strategy to reduce nutrient and sediment loads entering the Port Phillip Bay along watercourses.	CCMA, PPWCMA, EPA, MW, CCB, DPI, DSE, SRW	Higher
4.2	Implement Wyndham and Hobsons Bay stormwater management plans to better manage delivery of pollutants to stormwater, and retention and removal of pollutants from stormwater entering Ramsar sites.	MW, EPA, CoGG, BoQ	Medium
4.3	Support continued refinement and implementation of catchment protection measures in the Swan Bay catchment.	DPI, DSE, CCMA, CoGG, BoQ	Medium
4.4	Encourage the minimal use of fertilisers and other chemicals on private land adjoining the Point Cook Coastal Park/Cheetham Wetlands and on agriculturally managed parts of the park and provide buffers to minimise pollution of the wetlands.	PV, DPI, WCC	Lower
4.5	Investigate the impacts of salinity and levels of flow on the Lake Connewarre system from the Corangamite and Lough Calvert drainage schemes.	BW, SRW, CCMA, DSE	Lower
4.6	Monitor the extent and health of mangroves and seagrass in the Barwon estuary in relation to alterations in sediment flows, catchment water inputs and damage from boating.	BW, PV, EPA, DSE, BCCM, SCS	Lower
4.7	Ensure regional catchment strategies and subsidiary documents recognise and protect the Ramsar wetlands and other important wetlands that contribute to supporting species for which the Ramsar site is recognised, particularly threatened species and shorebird habitat.	DSE, CCMA, CoGG, BoQ	Lower

Management Objective 5

Manage resource utilisation on a sustainable basis

	Site Management Strategy	Lead agency	Priority
5.1	Participate in appropriate consents for use of adjacent land including, mineral extraction and intensive animal husbandry under the <i>Planning and Environment Act 1987</i> and during the Environmental Effects Statement process.	PV, DSE	Higher
5.2	Continue current monitoring, research and assessment programs on the impacts of recreational fishing and adjust regulations to ensure utilisation of fishery resources in line with ESD principles.	DPI	Higher
5.3	Manage marine national parks and marine sanctuaries in accordance with the National Parks Act 1975 and Werribee River Estuary Special Management Area in accordance with the ECC recommendations accepted by Government.	DSE, PV	Higher
5.4	Ensure that future aquaculture developments in and near the Ramsar site only occur if they do not impact on Ramsar site values and also meet other legislative and administrative requirements.	DPI, PV	Higher
5.5	Finalise and implement the Draft Ramsar and Conservation Management Plan - Western Treatment Plant, The Spit Nature Conservation Reserve and Adjacent Habitats (Lane et al.1999), relating to the protection of Ramsar values at the Western Treatment Plant.	MW	Higher
5.6	Ensure that no further clearing of native coastal vegetation occurs in or adjacent to the Ramsar site for agriculture or urban development.	Councils, DSE	Medium
5.7	Continue current controls on hunting to ensure a sustainable harvest.	DSE, PV	Medium

Management Objective 6

Protect, and where appropriate enhance, ecosystem processes, habitats and species

	Site Management Strategy	Lead agency	Priority
6.1	Protect all existing saltmarsh and mangrove habitats and, where practicable, rehabilitate areas subject to degradation.	DSE, PV, MW, Councils, Defence	Higher
6.2	Protect important habitats for internationally important migratory waders, particularly FFG, JAMBA, CAMBA and Bonn-listed species, and ensure important high tide roosting sites are not regularly disturbed by people.	DSE, PV, MW	Higher
6.3	Protect values of adjacent and nearby wetlands (Appendix 9) that contribute significantly to the ecological character of the Ramsar site.	PV, Defence	Higher
6.4	Finalise and/or implement the Cheetham Wetlands (PV 1996), Draft Ramsar and Conservation Management Plan - Western Treatment Plant, The Spit Nature Conservation Reserve and Adjacent Habitats (Lane et al.1999), Limeburners Bay (CoGG 2000), Swan Bay Marine & Wildlife Reserves (DCE 1991) and Lake Connewarre State Game Reserve (DCNR 1993) management plans.	PV, DSE, MW	Higher
6.5	Monitor the impact on ecosystems and waterbirds of water recycling and changes in sewage treatment processes and reduced nutrient inputs to the nearshore environment at the Western Treatment Plant. Where impacts are found to be adverse, ensure compensatory measures are implemented which may include: <ul style="list-style-type: none"> provision of additional, artificial habitat; local changes in the nature of discharges; and/or changes in sewage treatment processes. 	MW, DSE	Higher
6.6	Ensure implementation of the provisions of Action Statements under the <i>Flora and Fauna Guarantee Act 1988</i> for species in the Ramsar site that are covered by Action Statements.	DSE, PV	Higher
6.7	Implement and continually review activities and outcomes of elements of the Orange-bellied Parrot Recovery Plan that apply to the Port Phillip Bay Ramsar site.	OBP Recovery Team, DSE, PV,	Higher
6.8	Site any buildings, tracks and other structures to minimise disturbance to shorebirds habitat and disturbance to feeding and roosting birds.	All land managers	Higher
6.9	Investigate the effects of proposed aquaculture at Avalon on the ecological character of the Ramsar site.	DPI	Higher
6.10	Ensure municipal strategic statements and local planning schemes recognise and protect important wetlands and migratory shorebird values in the Ramsar site and also take account of the complementary values of wetlands outside the Ramsar site (Appendix 9).	Councils	Medium
6.11	Assist Councils in evaluating any applications for clearing native vegetation in wetland areas under the State Planning Policy Framework of planning schemes.	DSE	Medium
6.12	Ensure that grazing regimes and mowing in the Laverton-Point Cook area do not reduce grass and sedge vegetation in shallow swamps, drainage lines or fringes of larger wetlands.	DPI, PV, MW	Medium
6.13	Continue breeding habitat restoration and maintenance at The Spit Nature Conservation Reserve.	VWSG, PV	Medium
6.14	Ensure that the significance of shallow freshwater or slightly brackish wetlands between Laverton and Point Cook for shorebirds is recognised in management planning.	PV, DSE, MW	Lower
6.15	Protect woody and semi-woody wetland vegetation from fire.	All land managers	Lower

Management Objective 7

Encourage strong partnerships between management agencies

	Site Management Strategy	Lead agency	Priority
7.1	Provide support to Councils engaged in activities that protect and enhance Ramsar values around Port Phillip Bay.	PV, DSE, Councils	Higher
7.2	Develop a coordinated coastal planning framework incorporating Ramsar wetlands in Port Phillip Bay under the <i>Coastal Management Act 1995</i> that ensures wise use of the areas, consistent with the protection of the site's Ramsar values.	CCB	Higher
7.3	Ensure a coordinated approach to the management of the Port Phillip Bay Ramsar site, including integration with the Port Phillip and Western Port Regional Catchment Strategy, the Corangamite Regional Catchment Strategy, the Port Phillip Bay SEPP and the Victorian Coastal Strategy.	CCMA, PPWCMA, MW, EPA, DSE, PV, CCB, Councils	Higher

Management Objective 8

Promote community awareness and understanding and provide opportunities for involvement in management

	Site Management Strategy	Lead agency	Priority
8.1	Develop and implement a Port Phillip Bay Ramsar site wetland information and interpretation program.	PV, DSE, Councils	Higher
8.2	Encourage involvement of local Aboriginal people in all facets of Ramsar site management, consistent with the commitment of the Indigenous Partnership Strategy to recognise the fundamental role Aboriginal indigenous communities have in natural resource management.	All land managers	Higher
8.3	Consult with local Aboriginal people to ensure that other site management strategies in this plan do not adversely impact on Aboriginal cultural heritage values.	All land managers	Higher
8.4	Wherever appropriate, encourage and support the involvement of community groups and landholders in environmental research and management in the Port Phillip Bay Ramsar site.	All land managers	Higher
8.5	Encourage community groups, local schools and educational institutions to visit the Ramsar wetlands, and become involved in monitoring and rehabilitation.	PV, DSE, Councils	Medium
8.6	Establish a regular forum for community groups, landholders and management agencies to come together and discuss Ramsar site management and monitoring activities and outcomes.	DSE, PV	Medium
8.7	Retain the consultative committee for Cheetham Wetlands and extend its area of concern to other shorebird habitat in the Point Cook Coastal Park.	PV	Medium
8.8	Encourage private landowners adjacent to the Ramsar site to enter into conservation covenants, to protect sensitive areas and to actively manage the land for conservation purposes.	All land managers	Medium

Management Objective 9

Ensure recreational use is consistent with the protection of natural and cultural values

	Site Management Strategy	Lead agency	Priority
9.1	Educate local communities and visitors of the risks that recreational activities pose to Ramsar values, particularly to coastal vegetation and waterbird populations.	PV, DSE	Higher
9.2	Ensure that recreational development in and near wetlands of the Port Phillip Bay Ramsar site does not prejudice specific wetland values.	PV, DSE, Councils	Higher
9.3	Support local ecotourism initiatives that are compatible with the maintenance of Ramsar values.	DSE, PV, Councils	Medium
9.4	Apply an ecotourism accreditation scheme to ensure tour operators adopt clear strategies and procedures to reduce disturbance in the wetlands of the Port Phillip Bay Ramsar site.	Tourism Victoria, PV, DSE	Medium

Management Objective 9 (continued)

	Site Management Strategy	Lead agency	Priority
9.5	Discourage or prohibit the approach of jet skis within 150 metres of the mean high water mark on Mud Islands, Swan Bay and The Spit Nature Conservation Reserve, except in an emergency or for authorised research or management.	PV	Medium

Management Objective 10

Develop ongoing consistent programs to monitor ecological character

	Site Management Strategy	Lead agency	Priority
10.1	Prepare a coordinated program to monitor the ecological character of the Ramsar site identifying key indicators for recognised Ramsar values, monitoring regimes and reporting programs.	DSE	Higher
10.2	Implement a monitoring program at Cheetham Wetlands to ensure ongoing optimisation of water pumping, water level management and waterbird habitat enhancement.	PV	Higher
10.3	Implement a monitoring program to determine the impact of water recycling and changes in sewage treatment processes at the Western Treatment Plant.	MW	Higher
10.4	Closely monitor the status and management requirements of the critically endangered Orange-bellied Parrot in the Port Phillip Bay Ramsar site.	OBP Recovery Team, DSE, PV	Higher
10.5	Support continued monitoring of the status of water birds by community groups.	DSE, PV	Higher
10.6	Establish a regular seagrass monitoring program for Swan Bay and Limeburners Lagoon as a basis for determining the effectiveness of water quality management and as an indicator of environmental quality.	PV	Higher
10.7	Continue monitoring the status of Cord Grass infestations in the Lake Connearre and lower Barwon River wetlands as a basis for prioritising control works.	DSE, PV	Higher
10.8	Encourage submission of all flora and fauna observations in the Port Phillip Bay Ramsar site to update relevant Victorian databases.	DSE, PV	Medium
10.9	Monitor coastal erosion and sediment movement and the extent and health of sea grass beds.	DSE, PV, Councils	Medium
10.10	Prepare regular vegetation condition reports for the coastal vegetation (wetland and terrestrial) of the Port Phillip Bay Ramsar site.	PV, DSE	Lower

Lead agency key:

BoQ	Borough of Queenscliffe	MPC	Melbourne Port Corporation
BCCM	Barwon Coast Committee of Management	MW	Melbourne Water
BW	Barwon Water	PPWCMA	Port Phillip and Westernport Catchment Management Authority
CCB	Central Coastal Board		
CCMA	Corangamite Catchment Management Authority	PV	Parks Victoria
CoGG	City of Greater Geelong	SCS	Surf Coast Shire
DPI	Department of Primary Industries	SRW	Southern Rural Water
DSE	Department of Sustainability and Environment	TFN	Trust For Nature
		VCA	Victorian Channels Authority
ECC	Environment Conservation Council	VWSG	Victorian Wader Study Group
EPA	Environment Protection Authority	WCC	Wyndham City Council
MSV	Marine Safety Victoria		

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Appendix 1 List of Contributors

Multi-disciplinary Project Team members

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Peter Kemp	Conservation Project Officer, City and Bays Region, Parks Victoria	Liz Gould	former Project Officer, City of Greater Geelong
Colin Leigh	Project Officer, National Parks and Conservation Policy, Parks Victoria		

Public Submissions

Australasian Wader Study Group	Field and Game Australia Inc.
Australian Defence Organisation	Field Naturalists Club of Geelong Inc.
Baird, Bob	Friends of Mud Islands Inc.
Barwon Region Water Authority	Southern Rural Water
Bird Observers Club of Australia	Swan Bay Integrated Catchment Management Committee
Birds Australia	Victorian Channels Authority
Central Coastal Board	Victorian Farmers Federation
City of Greater Geelong	Victorian Wader Study Group Inc.
Corangamite Catchment Management Authority	
Environment Australia (Wetlands Unit)	

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Contacts for further information and collaboration

Association of Bayside Municipalities

Australian Conservation Foundation

Avalon Landcare Group

Barwon Coast Management

Bayside Friends of Native Wildlife

Bird Observers Club of Australia

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Birds Australia

Borough of Queenscliffe

Coalition Against Duck Shooting

Corangamite Catchment Management Authority

Corangamite Shire

Corio Landcare Group

Contacts for further information and collaboration continued

Field Naturalists Club of Victoria

Friends of Point Lillias and Corio Bay

Friends of the Marine Discovery Centre

Geelong Environment Council

Geelong Field and Game

Geelong Field Naturalists Club

Geelong Grammar School

Geelong Revegetation Organisation

Greater Geelong City Council

Hobsons Bay City Council

Limeburners Lagoon Boat Club

Melbourne Water

Port Phillip and Westernport Catchment Management Authority

Port Phillip Conservation Council Inc.

Seafood Industry Victoria

Swan Bay Integrated Catchment Management Committee

The Wathaurong Cooperative

Victorian Wetlands Trust Inc.

Wathaurong Aboriginal Co-operative

Western Region Environment Centre

Wyndham City Council

Related websites

www.ramsar.org

www.parkweb.vic.gov.au

www.dse.vic.gov.au

www.ea.gov.au

Appendix 3 Research List

Priority	Research Topic
Higher	<ul style="list-style-type: none"> • Impact of recreational fishing on Ramsar values. • Further research into managing requirements of the Orange-bellied Parrot. • Monitor change in sewage treatment processes at the Western Treatment Plant. • Monitor conditions at Cheetham Wetlands. • Monitoring of sea-grass in Swan Bay as an indicator of environmental quality.
Medium	<ul style="list-style-type: none"> • Further research on controlled grazing, impact and effects. • Cause of dieback of Mangroves at Limeburners Bay. • Comprehensive assessment of current research and understanding of water quality within Port Phillip Bay.
Lower	<ul style="list-style-type: none"> • Further research on weed control and recruitment of seeds.

Appendix 4 Threatened Status of Flora

Common name	Scientific name	FFG Listed	Status in Victoria	Status in Australia
Clover Glycine	<i>Glycine latrobeana</i>	L	v	V
Coast Bitter-bush	<i>Adriana quadripartita</i>		v	
Coast Hollyhock	<i>Malva sp. aff. australiana</i>		v	
Coast Saltwort	<i>Salsola tragus ssp. pontica</i>		r	
Coast Twin-leaf	<i>Zygophyllum billardierei</i>		r	
Coast Wirilda	<i>Acacia retinodes var. uncifolia</i>		r	
Creeping Rush	<i>Juncus revolutus</i>		r	
Marsh Saltbush	<i>Atriplex paludosa ssp. paludosa</i>		r	
Native Orache	<i>Atriplex australasica</i>		k	
Native Peppercross	<i>Lepidium pseudohyssopifolium</i>		k	
Oval Sea-wrack	<i>Halophila australis</i>		k	
Prickly Arrowgrass	<i>Triglochin mucronatum</i>		r	
Purple Blown-grass	<i>Lachnagrostis punicea ssp. punicea</i>		r	
Rare Bitter-bush	<i>Adriana quadripartita s.s. (glabrous form)</i>	L	e	
Salt Lawrencia	<i>Lawrencia spicata</i>		r	
Sea Water-mat	<i>Lepilaena marina</i>		v	
Small Scurf-pea	<i>Cullen parvum</i>	L	e	E
Tasman Grass-wrack	<i>Heterozostera tasmanica</i>		r	
Tiny Arrowgrass	<i>Triglochin minutissimum</i>		r	
Victorian Club-sedge	<i>Isolepis victoriensis</i>		k	
White Mangrove	<i>Avicennia marina ssp. australasica</i>		r	
Yellow Sea-lavender	<i>Limonium australe</i>		r	

Source: Victorian Flora Information System DSE (2003)

FFG Listed

L Listed under the *Flora and Fauna Guarantee Act 1988*

Status in Victoria

e Endangered, i.e. rare and at risk of disappearing from the wild state if present land use and other causal factors continue to operate.

v Vulnerable, i.e. rare, not presently endangered but likely to become so soon due to continued depletion, or which largely occur on sites likely to experience changes in land use which would threaten the survival of the species in the wild.

r Plants which are rare but which are not considered otherwise threatened. This category does not necessarily imply that plants are substantially threatened, but merely that there are relatively few known stands.

k species poorly known, suspected of being in one of the above categories.

Status in Australia under the EPBC Act 1999

CE A native species is eligible to be included in the critically endangered category at a particular time if, at that time, it is facing an extremely high risk of extinction in the wild in the immediate future, as determined in accordance with the prescribed criteria.

E A native species is eligible to be included in the endangered category at a particular time if, at that time:
(a) it is not critically endangered; and
(b) it is facing a very high risk of extinction in the wild in the near future, as determined in accordance with the prescribed criteria.

V A native species is eligible to be included in the vulnerable category at a particular time if, at that time:
(a) it is not critically endangered or endangered; and
(b) it is facing a high risk of extinction in the wild in the medium-term future, as determined in accordance with the prescribed criteria.

Appendix 5 Threatened Status of Fauna

Common name	Scientific name	FFG Listed	Status in Victoria	Status in Australia
Mammals				
Brush-tailed Phascogale	<i>Phascogale tapoatafa</i>	L, A	Vul	
Fat-tailed Dunnart	<i>Sminthopsis crassicaudata</i>		LR	
Grey-headed Flying-fox	<i>Pteropus poliocephalus</i>		Vul	V
Birds				
Australasian Bittern	<i>Botaurus poiciloptilus</i>	L	End	
Australasian Shoveler	<i>Anas rhynchotis</i>		Vul	
Australian Bustard	<i>Ardeotis australis</i>	L	CEn	
Australian Pratincole	<i>Stiltia isabella</i>		LR	
Baillon's Crake	<i>Porzana pusilla</i>	L	Vul	
Black Falcon	<i>Falco subniger</i>		Vul	
Black-browed Albatross	<i>Thalassarche melanophris</i>		End	
Black-faced Cormorant	<i>Phalacrocorax fuscescens</i>		LR	
Black-tailed Godwit	<i>Limosa limosa</i>		Vul	
Blue-billed Duck	<i>Oxyura australis</i>	L	End	
Brolga	<i>Grus rubicunda</i>	L	Vul	
Brown Quail	<i>Coturnix ypsilophora</i>		LR	
Cape Barren Goose	<i>Cereopsis novaehollandiae</i>		LR	
Caspian Tern	<i>Sterna caspia</i>	L	LR	
Common Diving-Petrel	<i>Pelecanoides urinatrix</i>		LR	
Common Sandpiper	<i>Actitis hypoleucos</i>		Vul	
Diamond Dove	<i>Geopelia cuneata</i>		LR	
Eastern Curlew	<i>Numenius madagascariensis</i>		LR	
Elegant Parrot	<i>Neophema elegans</i>		Vul	
Fairy Prion	<i>Pachyptila turtur</i>		Vul	V
Fairy Tern	<i>Sterna nereis</i>	L	End	
Freckled Duck	<i>Stictonetta naevosa</i>	L, A	End	
Glossy Ibis	<i>Plegadis falcinellus</i>		LR	
Great Egret	<i>Ardea alba</i>	L	Vul	
Great Knot	<i>Calidris tenuirostris</i>	L	End	
Greater Sand Plover	<i>Charadrius leschenaultii</i>		Vul	
Grey Goshawk	<i>Accipiter novaehollandiae</i>		Vul	
Grey Plover	<i>Pluvialis squatarola</i>		LR	
Grey-tailed Tattler	<i>Heteroscelus brevipes</i>	L	CEn	
Ground Parrot	<i>Pezoporus wallicus</i>	L	End	
Gull-billed Tern	<i>Sterna nilotica</i>	L	End	
Hardhead	<i>Aythya australis</i>		Vul	
Hooded Plover	<i>Thinornis rubricollis</i>	L, A	Vul	
Intermediate Egret	<i>Ardea intermedia</i>	L	CEn	
Latham's Snipe	<i>Gallinago hardwickii</i>		LR	

Common name	Scientific name	FFG Listed	Status in Victoria	Status in Australia
Lesser Sand Plover	<i>Charadrius mongolus</i>		Vul	
Lewin's Rail	<i>Rallus pectoralis</i>	L	Vul	
Little Bittern	<i>Ixobrychus minutus</i>	L	End	
Little Egret	<i>Egretta garzetta</i>	L	End	
Little Tern	<i>Sterna albifrons</i>	L, A	Vul	
Long-toed Stint	<i>Calidris subminuta</i>		Ins	
Magpie Goose	<i>Anseranas semipalmata</i>		Vul	
Musk Duck	<i>Biziura lobata</i>		Vul	
Nankeen Night Heron	<i>Nycticorax caledonicus</i>		LR	
Orange-bellied Parrot	<i>Neophema chrysogaster</i>	L, A	CEn	E
Pacific Golden Plover	<i>Pluvialis fulva</i>		LR	
Pacific Gull	<i>Larus pacificus</i>		LR	
Painted Snipe	<i>Rostratula benghalensis</i>	L	CEn	
Pectoral Sandpiper	<i>Calidris melanotos</i>		LR	
Pied Cormorant	<i>Phalacrocorax varius</i>		LR	
Plains-wanderer	<i>Pedionomus torquatus</i>	L, A	CEn	V
Red Knot	<i>Calidris canutus</i>		LR	
Red-chested Button-quail	<i>Turnix pyrrhotorax</i>		Vul	
Royal Spoonbill	<i>Platalea regia</i>		Vul	
Sanderling	<i>Calidris alba</i>		LR	
Shy Albatross	<i>Diomedea cauta</i>		Vul	V
Sooty Oystercatcher	<i>Haematopus fuliginosus</i>		LR	
Southern Giant-Petrel	<i>Macronectes giganteus</i>	L	Vul	E
Spotted Harrier	<i>Circus assimilis</i>		LR	
Terek Sandpiper	<i>Xenus cinereus</i>		End	
Whimbrel	<i>Numenius phaeopus</i>		Vul	
Whiskered Tern	<i>Chlidonias hybridus</i>		LR	
White-bellied Sea-Eagle	<i>Haliaeetus leucogaster</i>	L, A	Vul	
White-faced Storm-Petrel	<i>Pelagodroma marina</i>		LR	
White-fronted Tern	<i>Sterna striata</i>		LR	
White-winged Black Tern	<i>Chlidonias leucopterus</i>		LR	
Wood Sandpiper	<i>Tringa glareola</i>		Vul	
Reptiles				
Leathery Turtle	<i>Dermochelys coriacea</i>	L	CEn	V
Striped Legless Lizard	<i>Delma impar</i>	L, A	End	V
Amphibians				
Bibron's Toadlet	<i>Pseudophryne bibronii</i>		End	
Warty Bell Frog	<i>Litoria raniformis</i>	L	End	V
Fish				
Australian Grayling	<i>Prototroctes maraena</i>	L	Vul	V

Source: Atlas of Victorian Wildlife DSE (2003)

FFG Listed

- L Listed under the *Flora and Fauna Guarantee Act 1988*.
- A An action statement has been prepared for the management of this species.

Status in Victoria

- CEn Critically Endangered: A taxon facing an extremely high risk of extinction in the wild in the immediate future.
- End Endangered: A taxon that is not Critically Endangered but is facing a very high risk of extinction in the wild in the immediate future.
- Vul Vulnerable: A taxon that is not Critically Endangered or Endangered but is facing a high risk of extinction in the wild in the medium-term future.
- LR Lower Risk - near threatened: A taxon that does not satisfy criteria for any of the threatened categories, but which is close to qualifying for Vulnerable. In practice, these species are likely to move into a threatened category should current declines continue or catastrophes befall the species.
- DD Insufficiently known: suspected of being one of the above categories

Status in Australia under the EPBC Act 1999

- CE A native species is eligible to be included in the critically endangered category at a particular time if, at that time, it is facing an extremely high risk of extinction in the wild in the immediate future, as determined in accordance with the prescribed criteria.
- E A native species is eligible to be included in the endangered category at a particular time if, at that time:
(a) it is not critically endangered; and
(b) it is facing a very high risk of extinction in the wild in the near future, as determined in accordance with the prescribed criteria.
- V A native species is eligible to be included in the vulnerable category at a particular time if, at that time:
(a) it is not critically endangered or endangered; and
(b) it is facing a high risk of extinction in the wild in the medium-term future, as determined in accordance with the prescribed criteria.
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Appendix 6 JAMBA, CAMBA and Bonn species

Common name	Scientific Name	JAMBA	CAMBA	Bonn
Arctic Jaeger	<i>Stercorarius parasiticus</i>	✓		
Asian Dowitcher	<i>Limnodromus semipalmatus</i>		✓	✓
Baird's Sandpiper	<i>Calidris bairdii</i>	✓		✓
Bar-tailed Godwit	<i>Limosa lapponica</i>	✓	✓	✓
Black-shouldered Kite	<i>Elanus axillaris</i>			✓
Black-tailed Godwit	<i>Limosa limosa</i>	✓	✓	✓
Blue billed Duck	<i>Oxyura australis</i>			✓
Broad-billed Sandpiper	<i>Limicola falcinellus</i>	✓	✓	✓
Brown Falcon	<i>Falco berigora</i>			✓
Brown Goshawk	<i>Accipiter fasciatus</i>			✓
Cape barren Goose	<i>Cereopsis novaehollandiae</i>			✓
Caspian Tern	<i>Sterna caspia</i>		✓	✓
Cattle Egret	<i>Ardeola ibis</i>	✓	✓	
Common Greenshank	<i>Tringa nebularia</i>	✓	✓	✓
Common Sandpiper	<i>Actitis hypoleucos</i>	✓	✓	✓
Common Tern	<i>Sterna hirundo</i>	✓	✓	✓
Cox's Sandpiper	<i>Calidris paramelanotas</i>			✓
Curlew Sandpiper	<i>Calidris ferruginea</i>	✓	✓	✓
Double Banded Plover	<i>Charadrius bicinctus</i>			✓
Eastern Curlew	<i>Numenius madagascariensis</i>	✓	✓	✓
Fork-tailed Swift	<i>Apus pacificus</i>	✓	✓	
Freckled Duck	<i>Stictonetta naevosa</i>			✓
Glossy Ibis	<i>Plegadis falcinellus</i>		✓	✓
Great Egret	<i>Ardea alba</i>	✓	✓	
Great Knot	<i>Calidris tenuirostris</i>	✓	✓	✓
Greater Sand Plover	<i>Charadrius leschenaultii</i>	✓	✓	✓
Grey Plover	<i>Pluvialis squataroia</i>	✓	✓	✓
Grey-tailed Tattler	<i>Heteroscelus brevipes</i>	✓	✓	✓
Latham's Snipe	<i>Gallinago hardwickii</i>	✓	✓	✓
Lesser Sand Plover	<i>Charadrius mongolus</i>	✓	✓	✓
Little Curlew	<i>Numenius minutus</i>	✓	✓	✓
Little Ringed Plover	<i>Charadrius dubius</i>		✓	✓
Little Tern	<i>Sterna albifrons</i>	✓	✓	✓
Long-toed Stint	<i>Calidris subminuta</i>	✓	✓	✓
Magpie Goose	<i>Anseranas semipalmata</i>			✓
Marsh Sandpiper	<i>Tringa stagnatilis</i>	✓	✓	✓
Northern Shoveller	<i>Anas clypeata</i>		✓	✓
Oriental Plover	<i>Charadrius veredus</i>			✓
Pacific Golden Plover	<i>Pluvialis fulva</i>			✓
Painted Snipe	<i>Rostratula benghalensis</i>		✓	
Pectoral Sandpiper	<i>Calidris melanotos</i>	✓		✓

Common name	Scientific Name	JAMBA	CAMBA	Bonn
Red Knot	<i>Calidris canutus</i>	✓	✓	✓
Red-necked Phalarope	<i>Phalaropus lobatus</i>	✓	✓	✓
Red-necked Stint	<i>Calidris ruficollis</i>	✓	✓	✓
Ruddy Turnstone	<i>Arenaria interpres</i>	✓	✓	✓
Ruff	<i>Philomachus pugnax</i>	✓	✓	✓
Sanderling	<i>Calidris alba</i>	✓	✓	✓
Sharp-tailed Sandpiper	<i>Calidris acuminata</i>	✓	✓	✓
Short-tailed Shearwater	<i>Puffinus tenuirostris</i>	✓		✓
Terek Sandpiper	<i>Xenus cinereus</i>	✓	✓	✓
Whimbrel	<i>Numerius phaeopus</i>	✓	✓	✓
White-bellied Sea-eagle	<i>Haliaeetus leucogaster</i>		✓	✓
White-throated Needletail	<i>Hirundapus caudacutus</i>		✓	
White-winged Black Tern	<i>Chlidonias leucopterus</i>	✓	✓	✓
Wood Sandpiper	<i>Tringa glareola</i>	✓	✓	✓

Source: Atlas of Victorian Wildlife (1998)

Appendix 7 Pest species in the Port Phillip Bay Ramsar Site

Weeds

Common name	Scientific name
African Box-thorn	<i>Lycium ferocissimum</i>
African Thistle	<i>Berkheya rigida</i>
Aleppo Pine	<i>Pinus halepensis</i>
Apple of Sodom	<i>Solanum linnaeanum</i>
Bathurst Burr	<i>Xanthium spinosum</i>
Blackberry	<i>Rubus</i> spp.
Boneseed	<i>Chrysanthemoides monilifera</i>
Bridal Creeper	<i>Myrsiphyllum asparagoides</i>
Buffalo Grass	<i>Stenotaphrum secundatum</i>
Chilean Needle-grass	<i>Nassella neesiana</i>
Great Mullein	<i>Verbascum thapsus</i>
Horehound	<i>Marrubium vulgare</i>
Hoary Cress	<i>Cardaria draba</i>
Kikuyu	<i>Pennisetum clandestinum</i>
Myrtle-leaf Milkwort	<i>Polygala myrtifolia</i>
Paterson's Curse	<i>Echium plantagineum</i>
Prickly Pear	<i>Opuntia</i> spp.
Sand Rocket	<i>Diplotaxis tenuifolia</i>
Serrated Tussock	<i>Nassella trichotoma</i>
Sharp Rush	<i>Juncus acutus</i>
Spanish Artichoke	<i>Cynara cardunculus</i> <i>Datura</i> spp.
Sticky Ground-cherry	<i>Physalis viscosa</i>

Animals

Common name	Scientific name
Red Fox	<i>Vulpes vulpes</i>
Dog	<i>Canis familiaris familiaris</i>
Rabbit	<i>Oryctolagus cuniculus</i>
Feral Cat	<i>Felis catus</i>
European Carp	<i>Cyprinus carpio</i>

Northern Pacific Sea Star (*Asterias amurensis*)

The Northern Pacific Sea Star is a voracious predator of shellfish and is also known to prey on sponges, crustaceans, polychaetes and fish. In fact, the sea star will consume almost any animal tissue it can capture' (ENRC 1997). It poses a threat to 'marine ecosystems, aquaculture, wild fisheries and biodiversity'. The eggs and larvae are susceptible to uptake in ballast water. In recent years the sea star has been recorded in Port Phillip Bay.

Toxic dinoflagellates

It is thought that Toxic dinoflagellates species are transported in ballast water. They and have been found along the Victorian coast. Toxic algal blooms can lead to the closure of shellfish farms.

Japanese Kelp (*Undaria pinnatifida*)

Japanese kelp is transported in ballast water and may also be spread by commercial fishing boats through the kelp being caught up in nets. It poses a threat to endemic algal communities and can carry species of fungi which are pathogenic to native algae and seagrass. It is present in Port Phillip Bay.

Sabella Worm (*Sabella spallanzani*)

The sabella worm is transported on ships hulls and probably also in larval form in ballast water. It is present in Port Phillip Bay where populations have exploded and contracted over recent years.

European Shore Crab (*Carcinus maenas*)

The European Shore Crab occupies inter and subtidal zones and is 'an aggressive and voracious predator'. It is present in Western Port. Although it does not appear to have had any significant impact in Australia, overseas experience indicates that it can impact on aquaculture and threaten native species.

Asian Mussel (*Musculista senhousia*)

The Asian mussel can be transported on the exterior surfaces of ships and in larval form in ballast water. It is abundant in Port Phillip Bay. Mussel colonies can spread rapidly, adversely affect native fauna and pose a threat to mussel farms.

European Clam (*Corbula gibba*)

It is believed that the presence of this clam in Port Phillip Bay has contributed to the decline in scallop numbers. Other potential impacts are unknown.

Broccoli Weed or Codium (*Codium fragile tomentosoides*)

This algae is spread as a fouling organism on ships hulls and on the nets of fishing vessels. It 'displaces native benthic flora and fauna, fouls shellfish beds, competes with seagrass' and may adversely affect fisheries. It is present in Port Phillip Bay and was found at Newhaven and San Remo in Western Port in 1998 (NRE 1998 a,b).

Appendix 9 Important Wetlands near Port Phillip Bay Ramsar site

Several wetlands near or adjacent to the Port Phillip Bay Ramsar site are environmentally significant and compliment the site's ecological character. These areas (Table 9.1) provide important habitat for a wide range of threatened and/or listed migratory bird species. Although these areas are not included in the site they should be managed to maintain or improve their values to continue to compliment Ramsar site values

Swan Bay and other areas on the Bellarine Peninsula are recognised as significant habitat for migratory waders (Watkins 1993, Appleby 1997). A number of shorebird roosting sites are situated immediately outside the boundary of the Swan Bay component of the Ramsar site. In particular, these sites are popular roosting sites for a large number and diversity of migratory waders which are listed under JAMBA, CAMBA and the Bonn Convention.

A number of the sites listed below provide critical

wintering habitat for Orange-bellied Parrot which is listed as an endangered species in Australia, and a critically endangered species in Victoria. The Orange-bellied Parrot migrates annually between Victoria and Tasmania.

A number of surveys and reports (e.g. Watkins 1993) provide supporting information on the environmental values of adjacent wetland areas. Other areas of importance that are not included in the Ramsar site are the northern part of the Cheetham Wetlands, and wetland areas near Point Lillias and Point Wilson (Appleby 1997).

Although there are no proposals to formally add these wetlands to the Ramsar site, it is important to recognise the contribution adjacent wetlands make to the overall integrity of the Ramsar site. The Victorian Government is committed to managing the public land areas listed below in a way that is complimentary to the management of similar areas within the Ramsar site.

Table 9.1 Adjacent wetlands with high environmental value

Area	Land Status / Manager	Summary of significant values
Altona wetlands, Cheetham Wetlands (northern and western part), adjacent waters in Port Phillip Bay, Spectacle and RAAF Lakes, Red Gum Swamp and freshwater meadows and marshes along Point Cook Metropolitan Park access road	Point Cook Metropolitan Park (Parks Victoria) Unreserved Crown Land, Public Purposes Reserve (DSE) Commonwealth Land (Department of Defence, currently being transferred to Victoria)	<i>Avifauna</i> : Areas of international importance for Double-banded Plover, Eastern Curlew, Red-necked Stint, Sharp-tailed Sandpiper, Pacific Golden Plover and Banded Stilt (Watkins 1993)
Dry Saltmarsh and Big Marsh areas adjacent to The Spit Nature Conservation Reserve	Freehold	<i>Avifauna</i> : Areas of international significance for Orange-bellied Parrots (Appleby 1997)
Avalon Plains, including the Avalon Saltworks	Freehold and leased Crown land (Cheetham Salt P/L)	<i>Avifauna</i> : Areas of international significance for shorebirds (Appleby 1997)
Salt marsh north of Point Wilson	Commonwealth land (Department of Defence)	<i>Avifauna</i> : Areas of international significance for shorebirds and occasional habitat for Orange-bellied Parrots (Appleby 1997)
Sand Island	Unreserved Crown Land (Parks Victoria)	<i>Avifauna</i> : Eastern Curlew, Grey Plover, Curlew Sandpiper, Red-necked Stint, Ruddy Turnstone, Sharp-tailed Sandpiper, Pacific Golden Plover, Double-banded Plover, Common Greenshank, Orange-bellied Parrot, Little Tern, and Hooded Plover. <i>Flora</i> : Saltmarsh communities.

Area	Land Status / Manager	Summary of significant values
Swan Bay-Edwards Point Wildlife Reserve (Edwards Point, Western Shoreline of Swan Bay, Duck Island)	Nature Conservation Reserve (Parks Victoria)	<p><i>Avifauna:</i> Lewin's Rail, Eastern Curlew, Pacific Golden Plover, Red-necked Stint, Curlew Sandpiper, Sharp-tailed Sandpiper, Bar-tailed Godwit, Great Knot, Grey Plover, Red Knot, and Orange-bellied Parrot.</p> <p><i>Flora:</i> Grey Glasswort, Black-seed Glasswort, Coast Wirilda and Tiny Arrowgrass.</p>
Swan Island	Commonwealth Land (Department of Defence)	<p><i>Avifauna:</i> Roosting site for Red-necked Stint, Ruddy Turnstone, Bar-tailed Godwit, Orange-bellied Parrot, Red Knot, Common Greenshank, Grey Plover, and Great Knot.</p> <p><i>Flora:</i> Creeping Tussock-grass, Coast Wirilda, Rare Bitter-bush and Australian Hollyhock.</p>
Burnt Point – land and water adjoining and bounded by the southern arm of Burnt Point and Murray Road, Queenscliff.	Unreserved Crown Land (Parks Victoria, water and Bellarine Peninsula Railways, land)	<p><i>Avifauna:</i> Orange-Bellied Parrot, Little Egret, Great Egret, Caspian Tern, Royal Spoonbill, Crested Tern, Pied Cormorant, Pacific Gull.</p> <p><i>Fish:</i> Nursery areas for juvenile King George Whiting and Yellow-eyed Mullet.</p> <p><i>Flora:</i> Coastal Wirilda, Salt Lawrenzia, Marsh Saltbush and Yellow Sea-lavender.</p>
Reserve No. 1 – southwest shores of Swan Bay adjacent to Lakers Siding.	Parks Victoria	<p><i>Avifauna:</i> Orange-bellied Parrot.</p> <p><i>Flora:</i> Salt Lawrenzia.</p>
Reserve No. 2 – southwest shores of Swan Bay between Yarram Creek and Burnt Point.	Parks Victoria	<p><i>Avifauna:</i> Orange-bellied Parrot.</p> <p><i>Flora:</i> Grey Glasswort and Slender Velvet-bush.</p>
Rabbit Island	Public Purposes Reserve (Parks Victoria and Department of Defence which manages a strip allowing access to Swan Island)	<p><i>Avifauna:</i> Orange-bellied Parrot, Pied Oystercatchers.</p> <p><i>Flora:</i> Saltmarsh communities.</p>
Unnamed Island – between Rabbit Island and golf course	Unreserved Crown Land (Parks Victoria)	<p><i>Avifauna:</i> Orange-bellied Parrot.</p> <p><i>Flora:</i> Saltmarsh communities.</p>
Lonsdale Lakes Wildlife Reserve (Lake Victoria and Freshwater Lake)	Nature Conservation Reserve (Parks Victoria)	<p><i>Avifauna:</i> Great Egret, Black-tailed Godwit, Common Greenshank, Ruddy Turnstone, Red Knot, Red-necked Stint, Sharp-tailed Sandpiper, Curlew Sandpiper, Grey Plover, Caspian Tern, Crested Tern, Little Tern, Orange-bellied Parrot, Banded Stilt, Fairy Tern, Lathams Snipe, Blue-billed Duck, Musk Dick, Hardhead, Banded Stilt, Little Egret and Hooded Plover.</p> <p><i>Flora:</i> Coast Wirilda, Salt Lawrenzia, Grey Glasswort, Saltmarsh communities and Coastal Moonah Woodland Community.</p>

Area	Land Status / Manager	Summary of significant values
Ephemeral Wetlands – saltpans, sandspits and ponds adjacent to southern shores of Lake Victoria	Freehold	<p><i>Avifauna:</i> Orange-bellied Parrot.</p> <p><i>Flora:</i> Grey Glasswort, Salt Lawrenca; and Coastal Moonah Woodland Community.</p>
St Leonards Salt Lagoon	Wildlife Reserve (Parks Victoria)	<p><i>Avifauna:</i> Common Greenshank, Latham’s Snipe, Marsh Sandpiper, Black-tailed Godwit, Red Knot, Red-necked Stint, Sharp-tailed Sandpiper, Curlew Sandpiper, Pacific Gull, Crested Tern, and Banded Stilt.</p> <p><i>Flora:</i> Beaded Glasswort, Grey Glasswort, and Southern Sea-heath.</p>

Information Sheet on Ramsar Wetlands

Categories approved by Recommendation 4.7 of the Conference of the Contracting Parties.

1. Date this sheet was completed/updated:

May 1999

2. Country:

Australia

3. Name of wetland:

Port Phillip Bay (Western Shoreline) and Bellarine Peninsula

4. Geographical coordinates:

Latitude: 37° 53' S to 38° 18' S

Longitude: 144° 24' E to 144° 48' E

5. Altitude:

Less than 10 metres above sea level

6. Area:

22,897 ha

Note: This is a revised area figure based on GIS Mapping (1995) and does not represent any change to the Ramsar Site boundary.

7. Overview:

The site includes a variety of wetland types ranging from shallow marine waters to seasonal freshwater swamps and extensive sewage ponds which support a large and diverse population of migratory waders, seabirds and waterfowl; and demonstrate a range of geomorphic processes. Over 3 million people (70% of the State's population) live around the Bay which is used intensively for recreation.

The opening of the Bay (Port Phillip heads) is very narrow, reducing tidal amplitude within the bay compared with in Bass Strait. The intertidal mudflats, seagrass beds and saltmarshes support a very large and diverse range of migratory wading birds, seabirds and wildfowl.

8. Wetland Type:

Marine : A, D, E, F, G and H

Inland : M and Tp

Man-made : 3 and 8

9. Ramsar Criteria:

1a, 1b, 2b, 3a, 3b and 3c

Please specify the most significant criterion applicable to the site:

10. Map of site included?

Please tick yes -or- no

11. Name and address of the compiler of this form:

Parks Victoria
378 Cotham Road
Kew VIC 3101 Australia

12. Justification of the criteria selected under point 9:

1(a) The wetland is a particularly good representative example of a natural or near-natural wetland characteristic of the appropriate biogeographical region.

The Ramsar site includes a range of marine and inland wetlands characteristic of the South East Coastal Plain bioregion (Otway Plain subregion) and the Victorian Volcanic Plain bioregion as well as artificial wetlands.

1(b) The wetland is a particularly good representative example of a natural or near-natural wetland common to more than one biogeographical region.

The Ramsar site contains good examples of saltmarshes, estuarine wetlands and a shallow marine embayment and nearshore areas.

2(b) A wetland is of special value for maintaining the genetic and ecological diversity of a region because of the quality and peculiarities of its flora and fauna.

¹ Ramsar Information Sheets are formal documents lodged with the Ramsar Bureau. They are updated every six years. The last update was in 1999. New or revised information has not been added since 1999 and there may be inconsistencies with that in the body of the plan. The Ramsar Information Sheets will be updated next in 2005.

Lake Connewarre State Game Reserve is the largest area of native vegetation remaining on the Bellarine Peninsula and Reedy Lake is the largest freshwater lake in central Victoria.

The Ramsar site is one of the most important sites in Victoria for migratory shorebirds. The vegetation of Lake Connewarre State Game Reserve is very diverse, with 137 native plants being recorded. Forty-five (85%) of the 53 salt marsh species which occur in Victoria occur at Lake Connewarre. Reedy lake also has outstanding significance due to its large size, floristic richness and structural diversity (Yugovic 1985). The range of habitats within the Reserve leads to a very diverse avifauna, with 135 species being recorded (Pescott 1983).

3(a) Regularly supports 20,000 waterbirds

Wetlands in the Ramsar site regularly support more than 20,000 waterfowl, including large numbers of migratory waders, thousands of Black Swans, ducks, ibis and cormorants.

3(b) Regularly supports substantial numbers of waterbirds from particular groups

The Avalon-Werribee Wetlands regularly support tens of thousands of Straw-necked Ibis. In 1983, 14% of the Australian population of Chestnut Teal were recorded at the Western Treatment Plant (part of these wetlands) (ANCA 1996).

Swan Bay, Mud Islands, Werribee-Avalon, Lake Connewarre and Hospital Swamps are all recognised as wetlands of international importance to migratory waders (Watkins 1993).

3(c) Regularly supports 1% on the individuals in a population of one species or subspecies

Lake Connewarre has supported international significant numbers of Curlew Sandpipers and Sharp-tailed Sandpipers. Hospital Swamp has also supported international significant numbers of Sharp-tailed Sandpipers and nationally significant numbers of Curlew Sandpipers, Red-necked Stints and Marsh Sandpipers (ANCA 1996).

One per cent of the known Australian population of four migratory wader species: Pacific Golden Plover, Grey Plover, Mongolian Plover and Ruddy Turnstone have been recorded at Mud Islands and the islands are used as a high tide roosting area by 5% of the Victorian populations of Red Knots, Great Knots, Eastern Curlews and Bar-tailed Godwits. Nearly one quarter of the White-faced Storm Petrels in Victoria breed on Mud Islands (ANCA 1996).

One per cent of the known Australian population of four migratory wader species: Pacific Golden Plover, Grey Plover, Double-banded Plover and Eastern Curlew have been recorded at Swan Bay (ANCA 1996).

The Avalon Werribee Wetlands have supported more than 1% of the known Australian population of eight species of migratory waders and the largest Victorian breeding colony of Pied Cormorants.

13. General location:

- a) Parts of the shoreline, intertidal zone and adjacent wetlands of western Port Phillip Bay extending from Altona south to Limeburners Bay.
- b) Parts of the shoreline, intertidal zone and adjacent wetlands of the Bellarine Peninsula extending from Point Henry to Barwon Heads.

14. Physical features:

Port Phillip Bay lies in a sunkland formed by faulting and movement of the earth's surface during past geological eras. This low-lying area is a natural discharge point for the rivers draining southern central Victoria. It was a swampy lake even when sea levels were lower and the Yarra entered Bass Strait near Queenscliff. As the sea rose, it filled the sunkland, and wetlands formed further north at the deltas of a number of rivers and creeks.

The area contains five sites of State geomorphological significance:

Mud Islands - Ridges and Lagoons

Significance: This is the only known locality in Port Phillip Bay where consolidated dune rock is exposed above high water mark. The outcrop of cemented beach rock is the only known occurrence in Port Phillip Bay and is unusual on Victorian coasts. Mud Islands is the most obvious surface expression of the Port Phillip Sands, the shoal area overlying the Nepean Bay Bar. The islands are an unusual feature in Victoria and superficially resemble an atoll.

Hovells Creek - Mid-Holocene Sea Level Site

Significance: The site is one of a small number of dated marine shell beds on the Victorian coast that suggest a mid-Holocene sea level higher than the present level.

Limeburners Bay – Estuary

Significance: The site is an excellent example of a funnel-shaped, compound estuary. Many features typical of larger estuarine systems are here found in close proximity, such as active cliffs, marginal bluff, active and relict spits, mangrove and salt marsh zones, as well as terraces and other materials suggestive of higher sea level episodes. This is the best preserved estuary system in Port Phillip Bay and the most accessible one from Melbourne and Geelong. It is an outstanding site to demonstrate physiographical, hydrological, and ecological features of estuaries and coastal lagoons, and provides opportunity for studies into tidal circulation, salinity variation, sedimentation, shoreline evolution, and the dynamics of spit growth. It contains the most extensive stand of mangroves in Port Phillip Bay and probably the largest intact salt marsh complex. It is therefore a research and educational resource of considerable value.

Point Wilson - Shell Ridges

Significance: Adjacent to the Point Wilson jetty is an extensive belt of low, sparsely vegetated shelly ridges lying parallel to the coast and backed by a broad salt marsh. These ridges are an outstanding example of a shell-dominated coastal compartment and a rare example of actively prograding coastal ridges. The contrast in age, form and vegetation cover between the inner and outer ridges is of particular significance. The site has not been the subject of detailed geomorphological study and could form the basis of a major research project.

Sand Hummocks - Barrier Spits

Significance: The lagoon and barrier spits have no counterpart in Port Phillip Bay and are unusual features in the context of the Victorian coast. The scale of barrier development may be compared to that of the sand islands at Corner Inlet. It is an outstanding example of a tidal lagoon system not modified by land drainage but dominated by storm wave and tidal processes. The system constitutes a very significant site for the study of tidal and wave action in the formation and migration of barrier systems, and for sedimentation rates and processes in shallow lagoons. The marine and onshore components of the site include many features such as relict erosional and depositional landforms, sandy muddy and biogenic sediments, and vegetation sequences, that are relevant for the study of Holocene and contemporary sea levels in Port Phillip Bay.

The annual rainfall is about 750 mm. The range of mean temperatures is from a mean maximum of 24 °C in January and February to a mean minimum of 7 °C in July.

15. Hydrological values:

16. Ecological features:

Important wetland areas on the western shore of Port Phillip Bay and the Bellarine Peninsula include freshwater lakes, estuaries, some with White Mangrove (*Avicennia marina*), saltmarshes, intertidal mudflats and seagrass beds. The Melbourne Water Corporation Sewage Farm and Western Treatment Plant at Werribee supports many waterbirds on its retention ponds.

17. Noteworthy flora:

Pt. Cook Metropolitan Park is a site of State botanical significance. This is the only Reserve in the western region of Melbourne that contains examples of four vegetation types in proximity (dune vegetation, salt marsh, swamp and grassland). The salt marsh is an important habitat for the rare Orange-bellied Parrot. Several sites around the bay contain Grey Glasswort (*Halosarcia halocnemoides*) which more commonly occurs in north-western Victoria.

Limeburners Bay contains a zone of *Halosarcia halocnemoides* broader than that which is commonly found in Victorian coastal marshes. Where spit deposits raise the level of the marsh an assemblage of halophytes forms a low sward or type of saltmarsh meadow not as yet noted elsewhere in Victoria. Unlike most Victorian saltmarshes there is no broad zone dominated by *Sarcocornia quinqueflora*, and members of the Cyperaceae are comparatively unimportant. White Mangrove (*Avicennia marina*) occur.

Lake Connewarre contains the most extensive example of *Wilsonia* herblands and *Distichlis* grassland in Victoria. Grey Glasswort (*Halosarcia halocnemoides*) and Tangled Lignum (*Muehlenbeckia cunninghamii*) reach their southern limit within the Reserve. The White Mangrove (*Avicennia marina*) reaches its westernmost limit in Victoria in the Barwon River estuary. A total of 137 native and 78 exotic vascular plants were recorded for the Reserve, indicating a very high species richness for wetland vegetation.

Threatened Species

Rare in Victoria

- *Juncus revolutus* (Creeping Rush)

- *Triglochin minutissimum* (Tiny Arrow Grass)
- *Acacia retinodes* (Coast Wirilda)

Vulnerable in Victoria

- *Glycine latrobeana* (Clover Glycine)
- *Lepilaena marina* (Sea Water-mat)

Endangered in Victoria

- *Cullen parvum* (Small Scurf-pea)
- *Adriana quadripartita* (Rare Bitter-bush)

18. Noteworthy fauna:

Port Phillip Bay is home to a vast number of birds dependent on its coastal wetlands and sheltered waters. The area is of international significance due to the presence of large numbers of migratory wading birds, seabirds and because of its importance to waterfowl the endangered Orange-bellied Parrot. It is the sixth most important area in Australia for migratory waders and the most important in Victoria. It is also of national significance due to the large number of different bird species (many of them relatively rare) and the large concentration of cormorants, Pied Oystercatchers, Banded Stilts and Red-necked Avocets. The presence of large numbers of terns, crakes, rails, coots, Great Crested Grebes, Straw-necked Ibis and Royal Spoonbills also give it State significance.

Seabirds

Seabirds are a prominent feature of the birdlife, particularly in southern waters where shearwaters, skuas, albatrosses, prions and petrels feed. About 5500 White-faced Storm-petrel, one-quarter of the Victorian population, breed on Mud Islands and nearby South Channel Fort Island.

Lake Borrie is the site of the largest breeding colony of Pied Cormorants in the State - at last count there were 320 active nests.

Terns

Eleven species of tern have been recorded in the bay, including unusually large numbers of migratory Common Terns and lesser numbers of the rarer Arctic Tern. One of the largest breeding colonies (nearly a thousand) of Crested Terns in Victoria is situated on Mud Islands and a few Caspian Terns also nest there. Fairy Terns also breed at several locations including Mud Islands, the Spit and Swan Bay.

Gulls

Three species of gull occur in Port Phillip Bay, the

Silver, Pacific and Kelp. The Silver Gull is the most conspicuous and breeds in the area, at Mud Islands. Its numbers have increased dramatically in the last thirty years, possible due to an increased availability of food associated with nearby urban areas and rubbish tips.

Ibis, Herons, Spoonbills and Egrets

Tens of thousands of Sacred and Straw-necked Ibis roost at Lake Borrie. Yellow-billed and Royal Spoonbills occur regularly, particularly at the Spit, Avalon Saltworks and Swan Bay. Ibis and Spoonbill nest annually in Lake Connewarre Reserve.

Waders

Waders are the most numerous of the birds of Port Phillip. Most spend the spring, summer and early autumn in the bay, and banding has shown that the same individuals return to the same part of the bay every spring. Between 48000 and 65000 waders feed on the shores of the bay during summer, making it the sixth most important site for these birds in Australia.

The bay holds more than 1% of the known Australian population of fourteen species: Pied Oystercatcher; Grey, Lesser Golden, Mongolian and Double-banded Plovers; Banded Stilt; Red-necked Avocet; Ruddy Turnstone; Eastern Curlew; Greenshank; Marsh, Sharp-tailed and Curlew Sandpipers and Red-necked Stint. It holds more than 5% of the Victorian population of another dozen species: Sooty Oystercatcher; Large Sand and Red-capped Plovers; Whimbrel; Wood and Common Sandpipers; Grey-tailed Tattler; Latham's Snipe; Bar-tailed and Black-tailed Godwits; and Great and Red Knots.

Most waders occur on the sites along the western side of the bay, where five of the wetlands - Altona, Werribee-Avalon, Point Henry, Swan Bay and Mud Islands - can be considered of international importance on the basis of their wader populations alone.

Waterfowl (ducks and swans)

Waterfowl are another populous group. Swan Bay and the Altona and Werribee-Avalon wetlands hold particularly large populations.

In 1983 14% of the Australian total of Chestnut Teal were on the Werribee sewage farm. On Lake Borrie alone, 50,00 Pink-eared Duck have been seen and nearly 10,000 Black Swan Freckled Duck are also recorded regularly.

Other waterbirds

Other waterbirds such as grebes, coots, crakes and rails also occur in large numbers around Port Phillip, but the lack of studies elsewhere prevents any assessment of the bay's importance for the survival of these groups. The same is true for many land birds that live in coastal scrubs and saltmarshes around the bay.

Orange-bellied Parrot

The bay is crucial to the survival of one of the world's rarest and most endangered birds - the Orange-bellied Parrot. The total number in existence is estimated at 150 individuals, and about ninety of these parrots overwinter on saltmarshes around Port Phillip including Swan Bay, Pt Wilson and Lake Connemara. After breeding in south-west Tasmania during the summer, they migrate north across Bass Strait via King Island. Some then go north-west to the Coorong in South Australia, but the majority head east to Port Phillip Bay. Loss of saltmarsh, caused by construction of saltworks, port and industrial development and other activities, is thought to be one of the main reasons for the parrots' decline.

Swan Bay and Limeburners Lagoon are valuable fish breeding grounds for many of the commercial species caught in Port Phillip Bay.

Threatened Bird Species

Magpie Goose (*Anseranus semipalmata*) - was extinct in Victoria, but has been reintroduced.

Endangered in Victoria

- Little Tern (*Sterna albifrons*)
- Orange-bellied Parrot (*Neophema chrysogaster*)
- Australian Bustard (*Ardeotis australis*)

Vulnerable in Victoria

- Hooded Plover (*Charadrius rubricolis*)
- Fairy Tern (*Sterna nereis*)
- Plains-wanderer (*Pedionomus torquatus*) - also vulnerable nationally

Rare in Victoria

- Little Bittern (*Ixobrychus minutus*)
- Freckled Duck (*Stictonetta naevosa*)
- Cape Barren Goose (*Cereopsis novaehollandiae*)
- Blue-billed Duck (*Oxyura australis*)
- Grey Goshawk (*Accipiter novaehollandiae*)

- White-bellied Sea-Eagle (*Haliaeetus leucogaster*)
- Brolga (*Grus rubicundus*)
- Eastern Curlew (*Numenius madagascariensis*)
- Black Falcon (*Falco subniger*)
- Ground Parrot (*Pezoporus wallicus*)

Indeterminate (known to be Rare, Vulnerable or Endangered) in Victoria

- Lewin's Rail (*Rallus pectoralis*)
- Painted Snipe (*Rostratula benghalensis*)

Insufficiently known (suspected Rare, Vulnerable or Endangered) in Victoria

- Australasian Bittern (*Botaurus poiciloptilus*)
- Baillon's Crake (*Porzana pusilla*)
- Cox's Sandpiper (*Calidris paramelanotos*)
- Red-chested Button-quail (*Turnix pyrrhotorax*)
- Painted Snipe (*Rostratula benghalensis*)

Restricted colonial breeding or roosting sites in Victoria

- White-faced Storm-petrel (*Pelagodroma marina*)
- Australian Pelican (*Pelecanus conspicillatus*)
- Pied Cormorant (*Phalacrocorax varius*)
- Caspian Tern (*Hydroprogne caspia*)
- Crested Tern (*Sterna bergii*)
- Glossy Ibis (*Plegadis falcinellus*)
- Royal Spoonbill (*Platalea regia*)
- Intermediate Egret (*Ardea intermedia*)
- Great Egret (*Ardea alba*)

Threatened fish species

Vulnerable in Victoria and nationally

- Australian Grayling (*Prototroctes maraena*)
- Yarra Pigmy Perch (*Edelia obscura*)

Rare in Victoria

- Spotted Galaxias (*Galaxias truttaceus*)

Threatened mammals

Rare in Victoria

- Brush-tailed Phascogale (*Phascogale tapoatafa*)

Threatened reptiles

Rare in Victoria

- Swamp Skink (*Egernia coventryi*)

Vulnerable in Victoria and nationally

- Striped Legless Lizard (*Delma impar*)

Insufficiently known in Victoria and vulnerable nationally

- Leathery Turtle (*Dermochelys coriacea*)

19. Social and cultural values:

20. Land tenure/ownership:

The Melbourne Water Corporation manages the Werribee Sewage Farm and Western Treatment Plant. The coastline from the Spit to Limeburners Bay is vested in the Port of Geelong Authority and some of this is leased for salt production.

The remainder of the area is public land managed under the Victorian Department of Conservation and Environment Parks Program by Parks Victoria. The Spit, Lake Connewarre and Mud Islands are State Wildlife Reserves while Swan Bay and an area of water surrounding Mud Islands are marine reserves, recently re-reserved as Fisheries Reserves under the *Fisheries Act 1995*.

21. Current land use:

(a) the site: Recreation, nature conservation, sewage treatment, aquaculture, fishing, salt production.

(b) the surroundings/catchment: Grazing, industry including oil refining, quarrying, salt production and port facilities.

22. Factors (past, present or potential) adversely affecting the site's ecological character, including changes in land use and development projects:

No significant ecological change has occurred at the Port Phillip Bay (Western Shoreline) and Bellarine Peninsula site since the Ramsar Information Sheet was last updated in 1992.

Werribee Sewage Farm and Western Treatment Plant

The Victorian EPA have proposed changes to the licence conditions in 2005 for discharge of waste water from the treatment plant to the Bay. The lower nutrient levels required under the new licence will benefit water quality in the Bay but, at a more localised level, may affect waterbird

usage and abundance in the vicinity of Lake Borrie. Melbourne Water Corporation will commission studies in 1998/99 to investigate the likely impact of the changed licence conditions on the habitat of shorebirds and waterbirds in the Lake Borrie treatment system and along the adjacent shoreline. Variations on the operational parameters for achieving the licence conditions will be examined.

Other factors affecting the ecological character of the site at selected locations include pest plants and animals, livestock grazing and visitor impacts.

23. Conservation measures taken:

Environment Conservation Council Marine, Coastal and Estuarine Interim Report

The Environment Conservation Council of Victoria is carrying out an investigation of Victoria's marine, coastal and estuarine areas. In the Marine, Coastal and Estuarine Interim Report 1998 the Council recommended a Port Phillip Heads Marine Park with Mud Islands and Swan Bay (part of the Port Phillip Bay and Bellarine Peninsula Ramsar site) recommended as Sanctuary Zones. The recommendation is currently being considered by Government.

Planning Provisions

Some wetlands in the Port Phillip Bay (Western Shoreline) and Bellarine Peninsula Ramsar site have recently been placed on an environmental significance overlay in the City of Greater Geelong local planning scheme.

Swan Bay Marine and Wildlife Reserve Proposed Management Plan 1991 outlines strategies for the protection of the natural values of Swan Bay.

A fencing program has been undertaken to control livestock grazing of Lake Connewarre Wildlife Reserve.

The State Environmental Protection Policy (SEPP) (Waters of Port Phillip Bay) 1997 outlines measures to protect the water quality of Port Phillip Bay and has recommended the preparation of an environmental management plan for the Bay and its catchment.

Action Statements under the Flora and Fauna Guarantee Act 1988 have been produced for the following fauna species which occur at the site. The statements outline strategies for conserving the species.

- Orange-bellied Parrot (1993)

- Little Tern (1994)
- Hooded Plover (1996)
- Plains Wanderer (1995)
- White-bellied Sea-eagle (1994)
- Brush tailed Phascogale (1997)
- Stripped Legless Lizard (1994)

24. Conservation measures proposed but not yet implemented:

An Environmental Management Plan is being prepared for Port Phillip Bay to establish strategies for the protection of the environmental values of the Bay.

In an integrated approach to planning at Ramsar sites, management strategies are being prepared for all Ramsar sites in Victoria, including the Port Phillip Bay (Western Shoreline) and Bellarine Peninsula site, to provide general strategic direction and site specific strategies. The strategies will be completed by June 1999.

25. Current scientific research and facilities:

Marine Science Laboratories (Department of Conservation and Environment) are located at Queenscliff.

Marine Studies Centre which is a joint Department of Conservation and Environment, University of Melbourne, Monash University and Royal Melbourne Institute of Technology research centre.

Studies of the impact of grazing on saltmarsh communities are being conducted at Pt Wilson and Murtcaim.

26. Current conservation education:

The Victorian Institute of Marine Sciences centre at Queenscliff is used by school and public groups.

The whole of the Ramsar listed area has high potential for education because of its proximity to schools in Melbourne and Geelong.

27. Current recreation and tourism:

The major recreation uses of Port Phillip Bay are swimming, power boating, sailing, fishing, picnicking, sightseeing and camping and caravanning.

28. Jurisdiction:

Government of Victoria.

29. Management authority:

Managed under the Department of Natural Resources and Environment Parks Program by Parks Victoria - 18,649 Ha (81%)

Natural Resources and Environment - 27 Ha (0.1%)

Private Freehold - 468 Ha (2%)

Commonwealth - 1,575 Ha (6.9%)

30. Bibliographical references:

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