Port Phillip Bay (Western Shoreline) and Bellarine Peninsula

Ramsar Site Management Plan Summary

VICTORIA State Government | Environment, Land, Water and Planning

Photo credit
Annette Hatten, DELWP

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Contents

Abbreviations

CAMBA	China–Australia Migratory Bird Agreement
CEPA	Communication Education Participation and Awareness
CCMA	Corangamite Catchment Management Authority
CPS	Components, processes and services
DEDJTR	Department of Economic Development, Jobs, Transport and Resources (Victorian Government)
DELWP	Department of Environment, Land, Water and Planning, formerly Department of Environment and Primary Industries (Victorian Government)
DEPI	Department of Environment and Primary Industries, now Department of Environment, Land, Water and Planning (Victorian Government)
DEWHA	Department of Environment, Water, Heritage and the Arts, now Department of the Environment and Energy (Australian Government)
DoEE	Department of the Environment and Energy (Australian Government)
DSEWPaC	Department of Sustainability, Environment, Water, Population and Communities, now Department of the Environment and Energy (Australian Government)
ECD	Ecological Character Description
EPA Victoria	Environment Protection Authority Victoria
EPBC Act	Environment Protection and Biodiversity Conservation Act 1999
GMA	Game Management Authority
IUCN	International Union for Conservation of Nature
JAMBA	Japan–Australia Migratory Bird Agreement
LAC	Limits of Acceptable Change
MAs	Management Actions
MCA	Multiple Criteria Analysis
MERI	Monitoring, Evaluation, Reporting and Improvement
PPWCMA	Port Phillip and Westernport Catchment Management Authority
RCT	Resource Condition Target
RIS	Ramsar Information Sheet
RMP	Ramsar Management Plan
ROKAMBA	Republic of Korea–Australia Migratory Bird Agreement
SC	Steering Committee
SRW	Southern Rural Water
SAG	Stakeholder Advisory Group
VWMS	Victorian Waterway Management Strategy

1 Introduction

The *Port Phillip Bay (Western Shoreline) and Bellarine Peninsula Ramsar Site Strategic Management Plan* (Parks Victoria 2003) established a framework for the maintenance of this site's unique ecological character through conservation and wise use. The plan is now over a decade old and there has been significant progress in both our understanding of the ecological character and strategic direction in management of the site and Ramsar wetlands in Australia. A consultative and collaborative process was undertaken to review and update the Ramsar site management plan. The outputs of this review process are documented in two products:

1. A revised Port Phillip Bay (Western Shoreline) and Bellarine Peninsula Ramsar Site Management Plan, including a full description of the plan's development and technical appendices, and
2. A Port Phillip Bay (Western Shoreline) and Bellarine Peninsula Ramsar Site Management Plan summary document (**this document**) for a general audience that briefly outlines the process and details the management strategies and responsibilities.

1.1 Purpose of the management plan

1.1.1 Ecological character

Ramsar sites are wetlands that are recognised as having international importance under the 'Ramsar Convention on Wetlands', with Australia one of the first countries to sign in Ramsar, Iran in 1971. There are now 169 countries with over 2000 wetlands listed globally. Listing a wetland as a Ramsar site carries with it certain obligations, including managing the site to maintain its 'ecological character' and to have procedures in place to detect if any threats are likely to, or have altered 'ecological character'. Definitions for "ecological character" and "change in ecological character" are as follows (Ramsar Convention 2005):

> *"Ecological character is the combination of the ecosystem components, processes and benefits/services [CPS] that characterise the wetlands at a given point in time" and*
>
> *"…change in ecological character is the human induced adverse alteration of any ecosystem component, process and or ecosystem benefit/service."*

This Port Phillip Bay (Western Shoreline) and Bellarine Peninsula Ramsar Site Management Plan (RMP) sits within a framework for the management of aquatic ecosystems in Australia and the State of Victoria. At the national level, the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) establishes the basis for managing Ramsar sites; and a set of national guidelines for describing ecological character and developing management plans has been developed (DEWHA 2008). In Victoria, the *Victorian Waterway Management Strategy* (VWMS) guides the management of rivers, estuaries and wetlands. The RMP aligns with Action 3.4 and 3.9 in *Water for Victoria* by improving waterway health and knowledge of waterways and catchments. How this management plan fits in to the broader framework is illustrated in Figure 1.

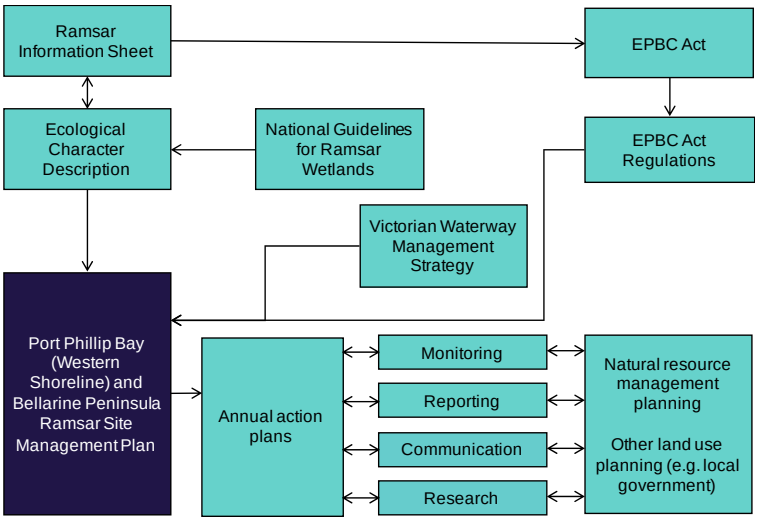


Figure 1: The RMP in context of other requirements for the management of Ramsar sites (adapted from DEWHA 2008).

Ramsar: A network of sites

There is a network of over 2000 Ramsar wetlands across the globe that is dedicated to sustaining biodiversity and wise use. One of the important functions, and a primary purpose for the establishment of the Convention, is to protect sites in different countries that are important for migratory birds.

The migratory birds that visit Australia are part of the East Asian–Australasian Flyway and most of them migrate from breeding grounds in North-east Asia and Alaska to non-breeding grounds in Australia and New Zealand, covering the journey of more than 10,000 kilometres twice in a single year.

The lifecycle of most international migratory shorebirds involves (Bamford et al. 2008):

- breeding in May to August (northern hemisphere)
- southward migration to the southern hemisphere (August to November)
- feeding and foraging in the southern hemisphere (August to April), and
- northward migration to breeding grounds (March to May).

During both northward and southward migration, birds may stop at areas on route to rest and feed. These stopovers are referred to as “staging” areas and are important for the birds’ survival. In addition, birds on their first southward migration that have not yet reached breeding maturity may remain in Australia over the southern winter period.

Other migratory species that are supported by the Port Phillip Bay (Western Shoreline) and Bellarine Peninsula Ramsar Site include species such as the double-banded plover, which migrate between New Zealand and Australia spending the non-breeding (winter) season on Australian shores.

The Port Phillip Bay (Western Shoreline) and Bellarine Peninsula Ramsar Site regularly supports 20 species that are international migrants and listed under migratory agreements with China, Japan and the Republic of Korea. Important habitats within the site include the extensive intertidal mudflats and saltmarsh where migratory waders feed. High tide roosting sites, where waders can rest are also important.

Migratory waders in Australia need to build up their energy reserves for the homeward journey. This means that they not only require abundant food sources, but they need to minimise their activity. Disturbance of shorebirds when roosting or feeding may result in a significant loss of energy. This may even compromise their ability to lay down sufficient fat reserves to complete the return journey to breeding grounds. Disturbance of migratory shorebirds may occur as a result of four-wheel driving on beaches or in saltmarsh and intertidal areas, unleashed dogs, recreational fishing (in some instances); boating, jet skiing, kite-surfing and any activity in the intertidal zone that causes significant noise or light. Migratory waders are also susceptible to predation by introduced foxes and cats.

Populations of many migratory wader species are in decline, primarily through loss of habitat in breeding and staging areas outside Australia. This makes them more vulnerable while in Australia and increases the importance of maintaining habitat and conditions at overwintering sites. Residents and visitors to the Ramsar site need to work together to help protect and conserve these important species.

1.1.2 Objectives of the management plan

The primary purpose of the RMP is to maintain ecological character and promote wise use of the site. Wise use is defined by the Convention as (Ramsar Convention 2005):

> *"the maintenance of their ecological character, achieved through the implementation of ecosystem approaches, within the context of sustainable development".*

The Port Phillip Bay (Western Shoreline) and Bellarine Peninsula Ramsar Site supports a number of environmental, economic, social and cultural values (see section 3). Socio-economic and cultural values of the site (e.g. tourism, recreation) result from maintaining the condition of the Ramsar site. This plan has adopted the principle that by maintaining (or improving) ecological character, the socio-economic and cultural values associated with the Ramsar site will also be conserved, within the concept of wise use. Therefore, the primary objective of the RMP is:

"***To maintain, and where necessary improve, the ecological character of the Port Phillip Bay (Western Shoreline) and Bellarine Peninsula Ramsar Site and support wise and sustainable use***".

1.2 Developing the plan

The Corangamite Catchment Management Authority (Corangamite CMA) was commissioned to facilitate the renewal of the 2003 Port Phillip Bay (Western Shoreline) and Bellarine Peninsula Ramsar Site Strategic Management Plan. The project was based on a robust and transparent method to analyse and prioritise values and threats within the Ramsar Site with the aim of maintaining and where possible, restoring the ecological character of the site, within a coordinated and collaborative framework for management.

Throughout the development of the RMP, a number of principles were adopted and underpinned the planning process, consistent with the guiding principles of the VWMS (Department of Environment and Primary Industries 2013):

- Stakeholder involvement – this RMP has been developed with the input of a broad range of stakeholders through every phase (see section 1.3.2).
- Evidence-based approach – best available knowledge has been used to underpin the development of this RMP including the risk assessment and prioritisation of values and threats.
- Precautionary principle – lack of full scientific certainty shall be not used as a reason for postponing cost-effective measures to prevent environmental degradation.
- Building on existing activities – there are a large number of activities already being implemented within the catchment and the Port Phillip Bay (Western Shoreline) and Bellarine Peninsula Ramsar Site to maintain and improve condition and ecosystem services. This RMP seeks to build on these existing activities rather than duplicate effort.
- Adaptive management – the RMPs life is for seven years, with a mid-term review after three years. A monitoring program has been included and the principles of monitor, evaluate, report and improve have been adopted.

2 Port Phillip Bay (Western Shoreline) and Bellarine Peninsula Ramsar Site

2.1 Location

Port Phillip Bay (Western Shoreline) and Bellarine Peninsula Ramsar Site is located on the western shoreline of Port Phillip Bay between the major cities of Melbourne and Geelong and on the Bellarine Peninsula (Figure 2). The site covers 22,650 hectares and comprises six distinct areas that include Point Cooke/Cheetham, Werribee/Avalon, Point Wilson/Limeburners Bay, Swan Bay, Mud Islands, and the Lake Connewarre complex. The site includes freshwater wetlands, estuaries, intertidal shorelines, sub-tidal beds, inland saline wetlands and a wastewater treatment facility. Extensive areas of coastal saltmarsh and seagrass occur within the Port Phillip Bay (Western Shoreline) and Bellarine Peninsula Ramsar Site, with smaller areas of freshwater vegetation within the Lake Connewarre complex.

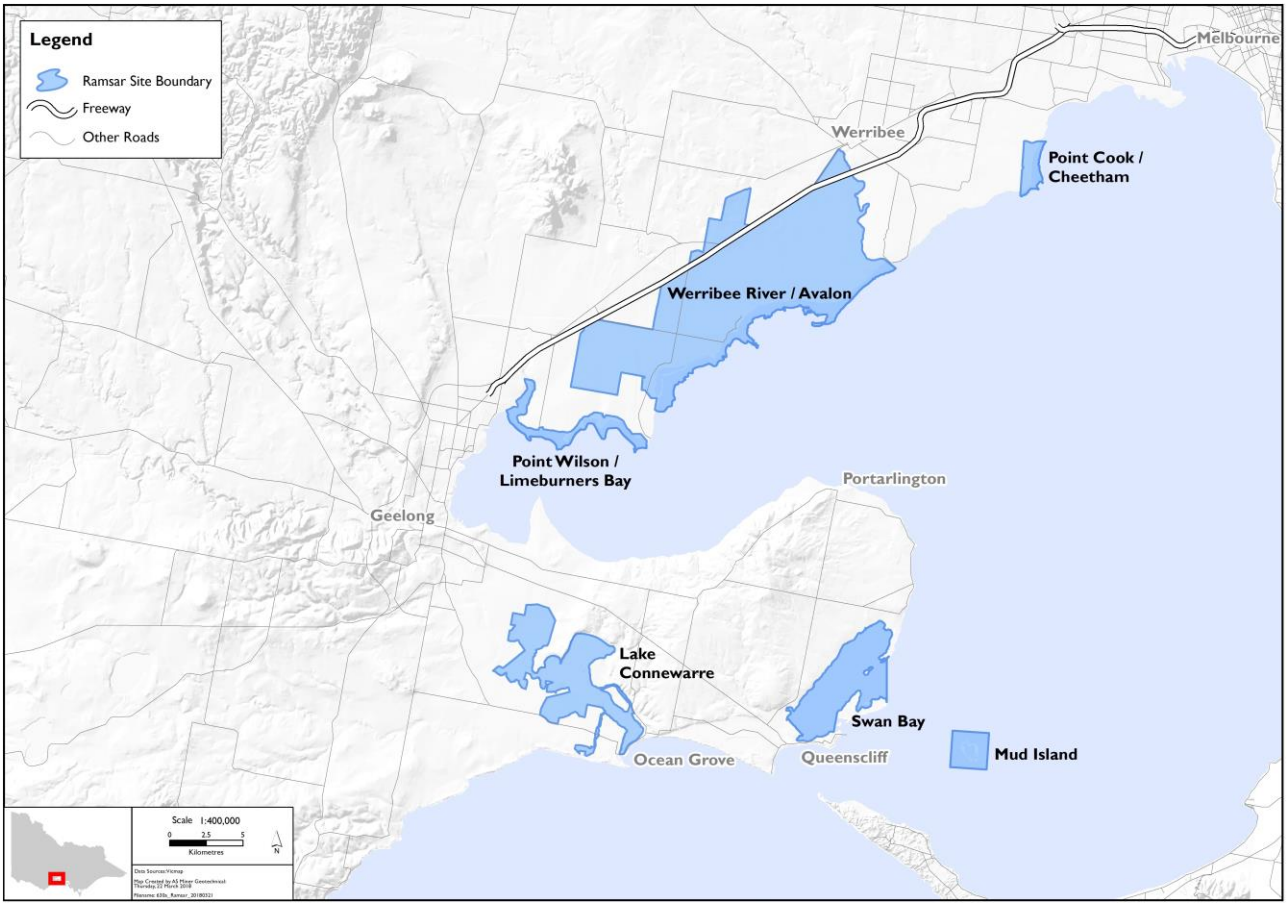


Figure 2: Map of the Port Phillip Bay (Western Shoreline) and Bellarine Peninsula Ramsar Site.

2.2 Ramsar criteria met

To be listed as a wetland of international importance under the Ramsar Convention, a site must meet at least one of the nine listing criteria. At the most recent assessment, in 2016, the Port Phillip Bay (Western Shoreline) and Bellarine Peninsula Ramsar Site met five of those criteria (Table 1).

Table 1: Criteria met by the Port Phillip Bay (Western Shoreline) and Bellarine Peninsula Ramsar Site.

Criteria	Justification
2. Supports vulnerable, endangered, or critically endangered species or threatened ecological communities	The site regularly supports one wetland dependent ecological community and 12 fauna species listed under the EPBC Act and or IUCN Red List (http://www.iucnredlist.org/): • Coastal saltmarsh – vulnerable ecological community (EPBC Act)

Criteria	Justification
	• Australasian bittern (*Botaurus poiciloptilus*) – endangered (EPBC Act and IUCN) • Australian fairy tern (*Sternula nereis nereis*) – vulnerable (EPBC Act) • Bar-tailed godwit (*Limosa lapponica baueri*) – vulnerable[1] (EPBC Act) and near threatened (IUCN) • Curlew sandpiper (*Calidris ferruginea*) – critically endangered (EPBC Act) and near threatened (IUCN) • Eastern curlew (*Numenius madagascariensis*) – critically endangered (EPBC Act) and endangered (IUCN) • Great knot (*Calidris tenuirostris*) – critically endangered (EPBC Act) and endangered (IUCN) • Hooded plover (*Thinornis rubricollis rubricollis*) – vulnerable (EPBC Act) • Lesser sand plover (*Charadrius mongolus*) – vulnerable (EPBC Act) • Red knot (*Calidris canutus*) – endangered (EPBC Act) and near threatened (IUCN) • Orange-bellied parrot (*Neophema chrysogaster*) – critically endangered (EPBC Act and IUCN) • Australian grayling (*Prototroctes maraena*) – vulnerable (EPBC Act) and near threatened (IUCN) • Growling grass frog (*Litoria raniformis*) – vulnerable (EPBC Act) and endangered (IUCN)
4. Supports plant and/or animal species at a critical stage in their life cycles, or provides refuge during adverse conditions	Port Phillip Bay (Western Shoreline) and Bellarine Peninsula supports large numbers of migratory waterbirds, breeding of waterbirds and frogs, nursery grounds for fish and supports waterfowl during moulting of their primary flight feathers.
5. Regularly supports 20,000 or more waterbirds	Waterbird counts across the Port Phillip Bay (Western Shoreline) and Bellarine Peninsula Ramsar Site are very high (mostly due to the large numbers of birds supported by the Western Treatment Plant). Counts of shorebirds have been consistently > 20,000 from 1981 to 2017 (data from BirdLife Australia) and counts of waterfowl are generally > 80,000.
6: Regularly supports 1% of the individuals in a population of one species or subspecies of waterbird	Data provided by BirdLife Australia and from the DELWP Annual Summer Waterfowl Counts, indicate that 12 species meet this criterion: • Australasian shoveler (*Anas rhynchotis*) • Australian fairy tern (Sternula nereis nereis) • Australian shelduck (*Tadorna tadornoides*) • Blue-billed duck (*Oxyura australis*) • Chestnut teal (*Anas castanea*) • Curlew sandpiper (Calidris ferruginea) • Double-banded plover (*Charadrius bicinctus*) • Hoary-headed grebe (*Poliocephalus poliocephalus*) • Musk duck (*Biziura lobata*) • Pink-eared duck (*Malacorhynchus membranaceus*) • Red-necked stint (*Calidris ruficollis*) • Sharp-tailed sandpiper (*Calidris acuminata*).

[1] Note that the Bar-tailed godwit subspecies *Limosa lapponica menzbieri* is listed as critically endangered. While it is possible that this species may occur in the Ramsar site, the sub species *baueri* is more prevalent on the east coast of Australia and likely to comprise the majority of records in Victorian Ramsar sites (Dan Weller, BirdLife personal communication).

Criteria	Justification
8: An important source of food for fishes, spawning ground, nursery and/or migration path on which fish stocks, either within the wetland or elsewhere, depend.	Seagrass beds and other habitats within the Ramsar site are known to provide important nursery habitat for a number of fish species, including several that are recreationally important.

2.3 Values

2.3.1 Critical components, processes and services

The Australian Government has developed and implemented a framework for describing the ecological character of Ramsar sites (Department of the Environment, Water, Heritage and the Arts 2008). This framework requires the identification and description of critical components, processes and services. These are defined as characteristics of the Ramsar site (Department of the Environment, Water, Heritage and the Arts 2008):

1. that are important determinants of the sites unique character;
2. that are important for supporting the Ramsar criteria under which the site was listed;
3. for which change is reasonably likely to occur over short to medium time scales (less than 100 years); and/or
4. that will cause significant negative consequences if change occurs.

The Port Phillip Bay (Western Shoreline) and Bellarine Peninsula Ramsar Site draft ECD (DELWP in prep.) identifies components, process and services that are critical to the ecological character of the Ramsar site. These are described briefly in Table 2, together with additional values of the site identified as important to this management plan (rocky reefs and social and cultural values). More detail on the ecological character of the site and each of the critical components, process and services can be found in the draft ECD.

Table 2: Values of the Port Phillip Bay (Western Shoreline) and Bellarine Peninsula Ramsar Site.

Value	Description
Geomorphology / ecological connectivity	Connectivity between freshwater and estuarine areas and estuaries and the marine environment are an important process for the Port Phillip Bay (Western Shoreline) and Bellarine Peninsula Ramsar Site. In particular, this is important in the Lake Connewarre Complex where the Ramsar site connects the upper Barwon River catchment with the Barwon Estuary and Bass Strait. This connectivity is important for ecosystem functioning and to a number of migratory fish.
Hydrology	There are four sub-components that comprise the hydrology of the Port Phillip Bay (Western Shoreline) and Bellarine Peninsula Ramsar Site: • tides (for all coastal and marine areas in the site) • river flows (Barwon River, Little River, Werribee River and Hovells Creek) • groundwater (particularly important for maintaining water regimes at the Lake Connewarre Complex), and • artificial water regimes (Western Treatment Plant and Cheetham Wetlands).
Seagrass	Seagrass is an important component of the ecological character of the Port Phillip Bay (Western Shoreline) and Bellarine Peninsula Ramsar Site at three locations: Point Wilson / Limeburners Bay; Swan Bay and Mud Islands.
Saltmarsh	Each segment of the Port Phillip Bay (Western Shoreline) and Bellarine Peninsula Ramsar Site contains coastal saltmarsh, with a total area of 1,225 hectares within the Ramsar site boundary (Boon et al. 2011). Saltmarsh occupies the area of the site between seagrass and terrestrial vegetation at higher elevation. The saltmarsh of Port Phillip Bay (Western

Value	Description
	Shoreline) and Bellarine Peninsula is diverse, with the saltmarshes in Lake Connewarre complex being recognised in particular for their complexity (Boon 2011).
Mangroves	The mangrove areas of Port Phillip Bay comprise a single species *Avicennia marina* and there are small areas of mangrove in Limeburner's Bay (four hectares) and the Barwon Estuary (40 hectares). The inundated roots and pneumatophores of mangroves provide good habitat for fish and invertebrates and play a role in stabilising the soft sediments in the site.
Freshwater vegetation	Freshwater vegetation in the Port Phillip Bay (Western Shoreline) and Bellarine Peninsula Ramsar Site is limited largely to Reedy Lake in the Lake Connewarre Complex, with smaller areas within the Western Treatment Plant, particularly at Paul and Belfrages Wetland Australian ecosystems (2016). Reedy Lake supports a habitat mosaic of open water, emergent freshwater vegetation (reed and sedge beds), submerged vegetation (e.g. *Myriophyllum* spp.) and lignum shrubland (Ecological Associates 2014, Corangamite CMA 2015).
Fish diversity and abundance	The Port Phillip Bay (Western Shoreline) and Bellarine Peninsula Ramsar Site provides a variety of habitats for fish ranging from purely freshwater species (in Reedy Lake) as well as estuarine and marine species in seagrass and saltmarsh habitats. Twelve freshwater fish species and over 60 marine / estuarine species have been recorded within the Ramsar site.
Waterbird diversity and abundance	A total of 129 waterbird species have been recorded within the Port Phillip Bay (Western Shoreline) and Bellarine Peninsula Ramsar Site, and the site regularly supports 20 species of shorebirds from the East Asian-Australasian Flyway listed under the international migratory bird agreements. The Ramsar Site provides significant foraging area for a variety of shorebird species, particularly along the shoreline of the Werribee / Avalon sector, where productivity is high. In addition to shorebirds, the site provides habitat for a variety of waterbird groups or guilds including ducks and swans; grebes; large wading birds such as herons, ibis and spoonbills; gulls and fish eating birds such as cormorants, pelicans and terns. Waterfowl counts at the Western Treatment Plant alone often exceed 100,000. The site supports > 1% of the population of 11 species of waterbird, this includes regularly supporting more than half the total population of blue-billed ducks DEWLP unpublished).
Waterbird breeding	The Port Phillip Bay (Western Shoreline) and Bellarine Peninsula Ramsar Site is important for waterbird breeding for a wide variety of species. The most significant waterbird breeding location in the site is Mud Islands, which supports large numbers of nesting birds including white-faced storm petrels, Australian pelicans, cormorants, ibis, terns and silver gulls (Menkhorst 2010).
Threatened species	Threatened species regularly supported by the Port Phillip Bay (Western Shoreline) and Bellarine Peninsula Ramsar Site include 10 species of bird, one frog and one fish species.
Intertidal reefs	Rocky reefs comprise a small area within the Ramsar site, around Point Cooke and the Point Wilson / Limeburner's Bay section of the Ramsar site. Within the Ramsar site boundary, they are largely intertidal and typically colonised by mat forming brown algae.
Social and cultural values	The Port Phillip Bay (Western Shoreline) and Bellarine Peninsula Ramsar Site includes parts of the Port Phillip Heads Marine National Park and the Point Cooke Marine Sanctuary. The Ramsar site is important to at least two indigenous language groups, Mud Islands is part of *Country* of the Boonwurrung and the remainder of the site is part of *Country* of the Wathaurong. The site contains the Western Treatment Plant which treats a significant proportion of Melbourne's wastewater and produces recycled water. The site is located close to the large cities of Melbourne and Geelong and is popular for recreation and tourism.

2.4 Current condition and Limits of Acceptable Change (LAC)

The mechanism against which change in ecological character is assessed is via comparison with Limits of Acceptable Change (LAC). LAC are defined by Phillips (2006) as:

"…the variation that is considered acceptable in a particular measure or feature of the ecological character of the wetland. This may include population measures, hectares covered by a particular wetland type, the range of certain water quality parameter, etc. The inference is that if the particular measure or parameter moves outside the 'limits of acceptable change' this may indicate a change in ecological character that could lead to a reduction or loss of the values for which the site was Ramsar listed. In most cases, change is considered in a negative context, leading to a reduction in the values for which a site was listed".

Exceeding or not meeting LACs does not necessarily indicate that there has been a change in ecological character within the meaning of the Ramsar Convention. However, exceeding or not meeting LACs may require investigation to determine whether there has been a change in ecological character. In Victoria, assessment of the status of ecological character occurs through the Ramsar Rolling review (DELWP in prep.). An example LAC and assessment from the most recent Ramsar Rolling Review is provided in Table 3.

Table 3: Example of a LAC and an assessment against current condition

Critical CPS	Limit of Acceptable Change	2016 Assessment
Seagrass	• Seagrass extent will not decline below 1500 hectares for a period of greater than 20 continuous years.	Mapping from 2000 indicate a total of 2900 hectares of seagrass within the Ramsar site boundary in 2000. A recent assessment indicated that seagrass cover in Swan Bay had changed little from 2008 to 2012 (Ball et al. 2014). **LAC is met.**

Establishing the benchmark: "At the time of listing"

The Ramsar Convention establishes the benchmark for the ecological character of listed wetlands as:

"*at the time of designation as a Ramsar Wetland of International Importance*" (Resolution VI.1 Annex Para 2.1).

This is an important concept for understanding the goal of maintaining ecological character and assessing change in character. Aquatic ecosystems are rarely static and stable, Port Phillip Bay (Western Shoreline) and Bellarine Peninsula Ramsar Site is no exception. There are ongoing changes, many of which commenced prior to designation, with a continuing trajectory of change. Establishing a benchmark, against which change in ecological character can be assessed, is a task for the Ecological Character Description, using Limits of Acceptable Change. Maintaining the site's ecological character in a changing environment is a challenge for Ramsar site management.

Sometimes changes in identified critical components, processes and services are due to factors that are outside the Ramsar boundary and beyond the control of site managers. The decline in several shorebirds and the orange-bellied parrot in the Ramsar site are examples of this. There have been a large number of investigations into the decline of shorebirds in the East Asian-Australasian Flyway, with habitat declines particularly at staging areas in the Yellow Sea recognised as the most significant impact factors (MacKinnon et al. 2012, Murray et al. 2015, Hua et al. 2015). In terms of the orange-bellied parrot a decline in habitat extent and quality has been implicated (DELWP 2016).

Ramsar site managers need to work to maintain habitat and food resources for these species at the local scale to maximise their chances of long term recovery and survival. There is a comprehensive program in place for the recovery of the orange-bellied parrot and the Port Phillip Bay (Western Shoreline) and Bellarine Peninsula Ramsar Site is playing an important role.

Eleven orange-bellied parrots that were bred in captivity were released at the Western Treatment Plan during April 2017. A loose flock of released and wild birds formed which actively foraged on the plentiful supply of wild food. It is hoped that future efforts will restore this population of critically endangered birds (OBP Recovery Team).

Image: Orange-bellied parrot in saltmarsh (Chris Tzaros).

3 Priority values and threats

A risk assessment was completed for the Port Phillip Bay (Western Shoreline) and Bellarine Peninsula Ramsar Site with the input of scientific experts and local knowledge. The purpose of the risk assessment was to identify priority values and threats to inform strategic actions in this RMP (Figure 3).

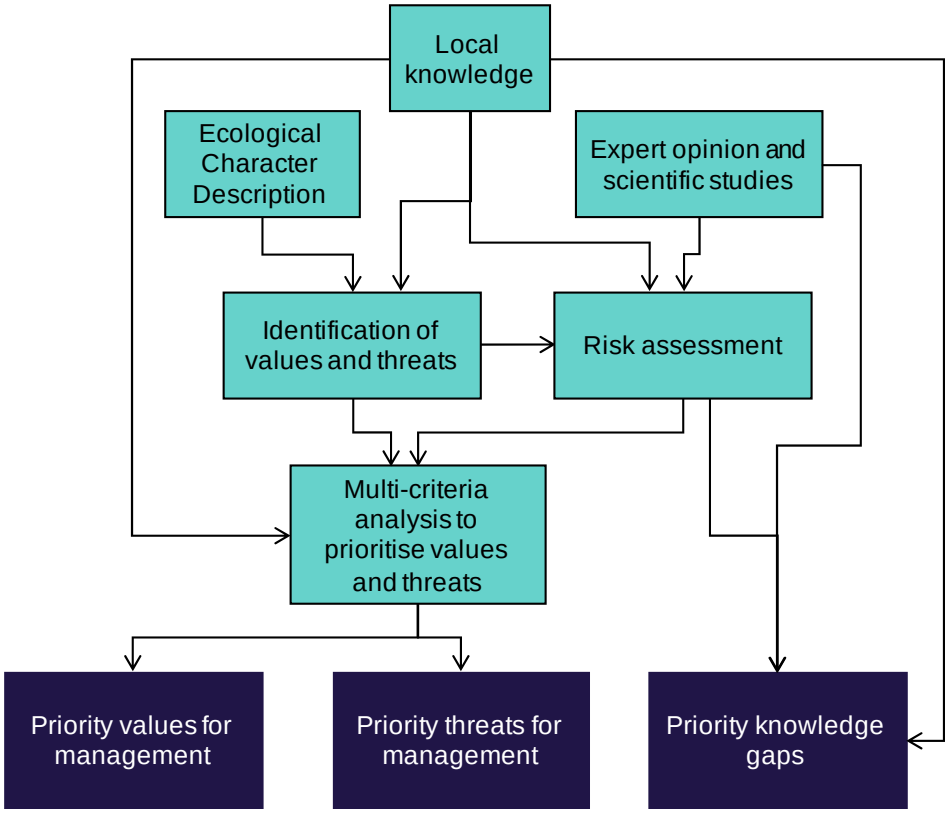


Figure 3: Process of prioritising values and threats and the role of the risk assessment.

Priority threats and values are listed in Table 4 and Table 5 respectively and the relationship between values and threats is illustrated in Figure 4. In addition, 10 knowledge gaps were identified in the process:

1. Chemicals of emerging concern (e.g. pharmaceuticals): sources, concentrations and risk to the Ramsar site
2. Micro-plastics: risk to ecological character
3. Effect of mosquito control chemicals on waterbirds through the food chain
4. Water quality of stormwater discharges in key locations, including Swan Bay
5. Potential impacts of stormwater discharge on Hospital Swamp
6. Impacts of duck hunting on disturbance shorebirds
7. Freshwater inflows to Swan Bay - magnitude and effects on ecology
8. The benefits of surrounding wetland systems on the ecological character of the Ramsar site (Swan Bay in particular)
9. Causes and effects of pathogens and disease among waterbirds (e.g. botulism, avian cholera)
10. The impacts of introduced marine pests on ecological character.

Table 4: Values at each location in the Ramsar site (those shaded are identified as the highest priority).

Values Ecological values	Location					
	Cheetham	Werribee	Pt Wilson	Swan Bay	Mud Is.	Lake Conn.
Hydrology (including connectivity)	X	X	X			X
Intertidal flats	X	X	X	X	X	X
Intertidal reefs	X		X			
Seagrass		X	X	X	X	X
Coastal saltmarsh	X	X	X	X	X	X
Mangroves			X			X
Freshwater aquatic vegetation		X				X
Waterbird diversity and abundance	X	X	X	X	X	X
Waterbird breeding	X	X	X	X	X	X
Diversity and abundance of fish		X	X	X	X	X
Threatened species: Australasian bittern		X				X
Threatened species: beach nesting birds	X	X	X	X	X	X
Threatened species: shorebirds	X	X	X	X	X	X
Threatened species: orange bellied parrot		X	X	X		X
Threatened species: growling grass frog		X				X
Threatened species: Australian grayling						X
Socio-economic and cultural values						
Recreational fishing			X	X	X	X
Commercial fishing						X
Water based recreation (swimming, boating)		X	X	X	X	
Beside water recreation (camping, bushwalking, nature observation)	X	X	X	X		X
Aboriginal cultural heritage	X	X	X	X	X	X
Game hunting		X	X			X
Tourism	X	X	X	X		X
Education	X	X	X	X	X	X

Table 5: Priority threats at each location in the Ramsar site (those shaded are identified as the highest priority).

Threats	Location					
	Cheetham	Werribee	Pt Wilson	Swan Bay	Mud Is.	Lake Conn.
Climate change: sea level rise impacting on intertidal vegetation and waterbird habitat	X	X	X	X	X	X
Climate change: increased temperature increases the frequency and severity of avian disease	X	X			X	
Climate Change: increased intensity of storms resulting in erosion of shoreline habitats	X	X		X	X	
Changed operations at the Western Treatment Plant decreasing nutrients and carbon	X	X	X			
Toxicants from catchment inflows and stormwater	X	X	X	X		X
Emerging chemicals of concern from the Western Treatment Plant	X	X	X			
Stormwater results in decreased salinity and altered water regimes						X
Urban development: direct habitat removal and loss of buffer	X	X	X	X		X
Litter (including micro-plastics) effects biota	X	X	X		X	
Invasive species: foxes and cats predating on waterbirds	X	X	X	X		X
Invasive species: salt tolerant weeds impacting saltmarsh and waterbird habitat	X	X	X	X	X	X
Invasive species: non-native grazing animals (rabbits and deer) impacting vegetation and habitat		X	X			X
Invasive species: silver gulls and ibis impacting breeding of other bird species (terns and petrels)					X	
Recreation: boats, jets skis, kite surfers disturbing waterbird feeding, breeding and roosting	X	X	X	X	X	X
Recreation: walkers, horse-riding disturbing waterbird feeding, breeding and roosting	X	X	X	X	X	X
Recreation: vehicles damaging saltmarsh			X			X
Duck hunting impacts to non-target species		X	X			X

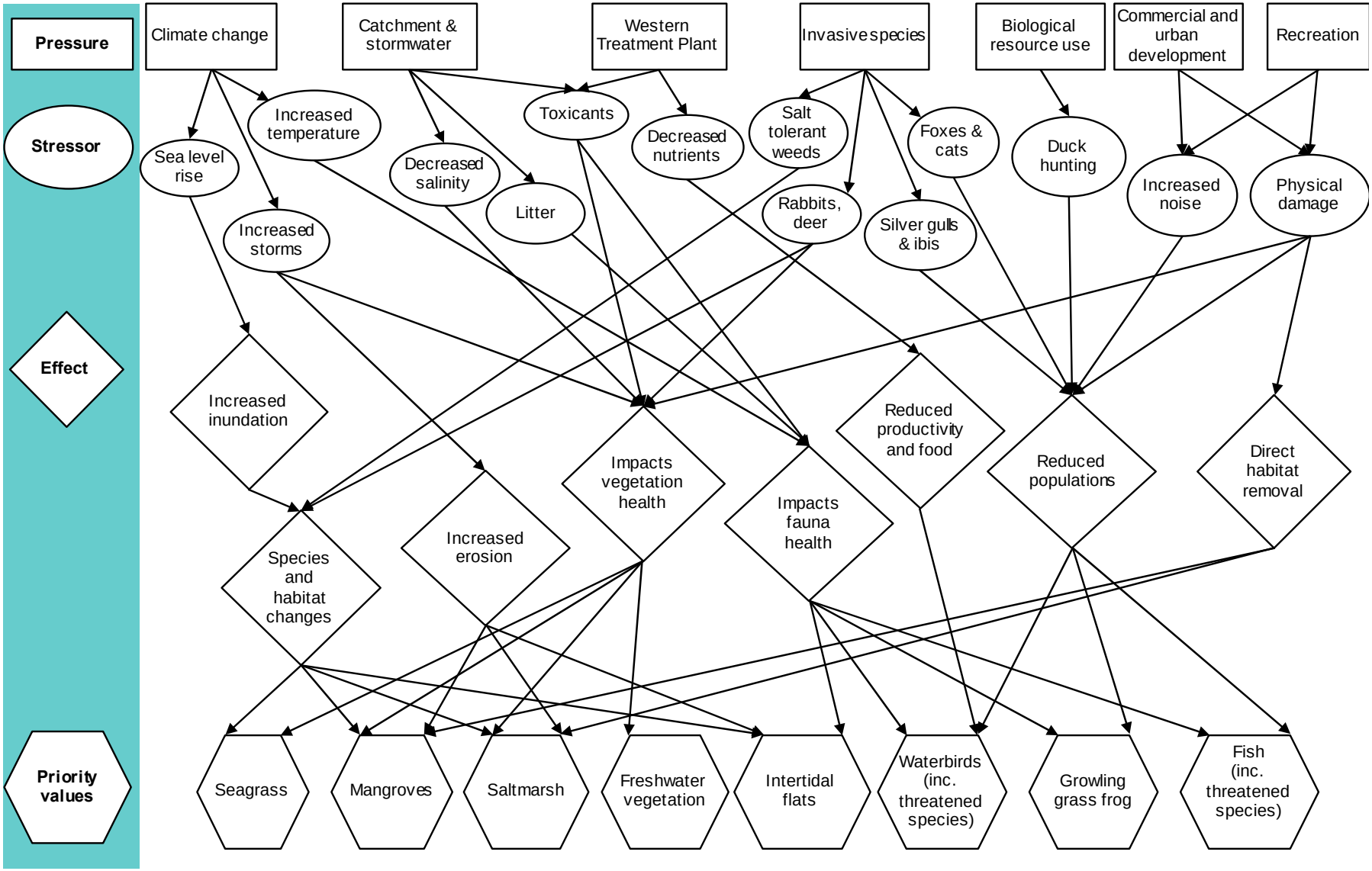


Figure 4: Stressor model illustrating the major linkages between high priority threats (pressures and stressors) and high priority values.

Integrated Water Management Framework for Victoria

Integrated water management (IWM) is a collaborative approach to planning, bringing together organisations that influence the management of all elements of the water cycle including that of:

- waterways and bays
- wastewater management
- alternative and potable water supply
- stormwater management and
- water treatment

The framework aims to build collaborative solutions to the management and delivery of water in cities, towns and rural areas. An example of this is the management of stormwater in areas in and adjacent to the Ramsar site which is located close to the two largest cities in Victoria, Melbourne and Geelong, with significant current and planned future development. This poses an increased the level of risk to the site's ecological character if not managed carefully.

Several of the wetlands within the Ramsar site are threatened by stormwater discharges, altering both water regimes and salinity (e.g. Hospital Swamp and Lake Murtnaghurt in the Lake Connewarre Complex). IWM provides opportunities to maintain and restore ecological character by innovative water management. For example, using the planned Sparrovale Regional Wetlands to process stormwater from the Armstrong Creek development will reduce the impact from excessive freshwater discharge to the Ramsar site, and provide complementary aquatic habitat.

The Barwon Region Integrated Water Cycle Management (IWCM) Network was established in 2012. It is a commitment by the region's lead organisations in urban and water planning to work together to apply IWCM. Collaborating agencies include Barwon Water, Borough of Queenscliff, City of Greater Geelong, Colac Otway Shire and Surf Coast Shire, who have agreed to:

- strengthen the existing relationships between the region's key urban and water planners
- work collaboratively to promote IWM approaches at policy and program levels and through actions
- work cooperatively to raise awareness of the role of water in the region's liveability, sustainability and productivity.

Armstrong Creek Development.

4 Site management strategies

4.1 Approach

4.1.1 Review of the 2003 plan

The 2003 Port Phillip Bay (Western Shoreline) and Bellarine Peninsula Strategic Management Plan contained 10 management objectives and 91 associated site management strategies. These were reviewed with respect to progress towards implementation and / or achieving the stated strategy, and relevance to current priority values and threats at the site (Appendix C). Strategies in the 2003 management plan that were relevant to identified priority values and threats were used to inform the development of management strategies for this current management plan.

4.1.2 Targets

There are two types of indicators that are relevant to the management of the Ramsar site:

1. **Limits of Acceptable Change (LAC)** are set in the Ecological Character Description (ECD) and are based on the conditions at the time of listing. LACs can be updated based on new knowledge that improves confidence in the LACs. These are the thresholds at which ecological character may be compromised.
2. **Resource Condition Targets (RCTs)** are established in the RMP and are the aspirational condition for each of the identified priority values (i.e. where do we want / expect the condition of each priority value to be at the end of this management plan?). These will help to assess the effectiveness of the management plan in maintaining (or improving) ecological character.

A total of 10 RCTs have been defined for the Port Phillip Bay (Western Shoreline) and Bellarine Peninsula Ramsar Site (Table 6). These have helped to guide the identification of management strategies and provide a goal for monitoring the ecological character of the site and determining when additional interventions may be required.

Table 6: Resource Condition Targets for the Port Phillip Bay (Western Shoreline) and Bellarine Peninsula Ramsar Site.

Resource Condition Target	Relevant priority values
Maintain connectivity between the Barwon River and the Southern Ocean.	Hydrology, fish, Australian grayling
Maintain Cheetham Wetlands according to the hydrological management manual. That is, in spring: 3% of ponds in a dry state, 67% shallow and suitable for migratory shorebird foraging and 30% deep for longer legged shorebirds.	Hydrology, waterbirds
Maintain condition and extent of seagrass within the Ramsar site (i.e. >2900 hectares)	Seagrass
Maintain condition and extent of saltmarsh within the Ramsar site (i.e. >1200 hectares)	Coastal saltmarsh
Maintain condition and extent of mangroves within the Ramsar site (i.e. >50 hectares)	Mangrove
Maintain condition and extent of freshwater emergent vegetation at Reedy Lake.	Freshwater vegetation.
Maintain abundance of waterfowl (i.e. maximum total annual abundance is > 80,000). Maintain abundance of shorebirds (i.e. maximum total annual abundance is > 20,000).	Waterbird abundance
Maintain abundance of nesting birds at the Western Treatment Plant (> 500 pairs of pied cormorant). Mud Islands: Maintain breeding colonies of White-faced storm petrels, and crested terns (noting that abundance is a knowledge gap).	Waterbird breeding
Re-establish orange-bellied parrots within the Ramsar site. Maintain Australian fairy tern, bar-tailed godwit, eastern curlew, great knot, hooded plover, lesser sand plover and red knot within the site.	Threatened species: birds
Maintain population of growling grass frog in the Western Treatment Plant.	Threatened species: Growling grass frog.

4.2 Theme 1: Protecting flora and fauna

Pest plants and animals, recreational activities, direct habitat removal through residential development and biological resource use were all identified as high priority threats to the plants and animals of the Port Phillip Bay (Western Shoreline) and Bellarine Peninsula Ramsar Site. While there has been a large and coordinated program to control predators and pest plants within the Ramsar site, this work needs to be maintained. Similarly, while the relevant authorities assess individual development proposals, a coordinated approach to assessing the effect of multiple actions and developments may be required to adequately maintain ecological character. Essential to this will be careful consideration of appropriate management of buffers between the Ramsar site and adjacent activities and land uses.

Nine management strategies have been identified to protect flora and fauna (Table 7).

Table 7: Management strategies and responsible organisations for protecting flora and fauna.

Management strategy	Responsibility	Linkages to existing programs / activities	Relevant locations
1.1 Manage human access to minimise disturbance at waterbird and seabird breeding colonies in the Port Phillip Bay Ramsar site during the breeding season.	Parks Victoria		Mud Islands, Lake Connewarre complex
1.2 Work with the community, tour operators and other stakeholders to minimise impacts to shorebirds and nesting birds from recreational boating activities.	Parks Victoria DELWP	Port Phillip Bay Environmental Management Plan (EMP)	Mud Islands Swan Bay
1.3 Monitor priority locations for marine pests and respond rapidly to new introductions.	Parks Victoria DEDJTR EPA Victoria	Port Phillip Bay Parks Victorian Marine Invasive Species Guide	All coastal areas
1.4 Develop and implement measures to control carp within the Barwon River, Reedy Lake and Hospital Swamp.	CCMA Parks Victoria	Corangamite Waterway Strategy	Lake Connewarre complex
1.5 Continue to implement pest plant and animal control in priority locations for species identified as a significant threat to ecological character (i.e. salt tolerant weeds in saltmarsh; cats and foxes in orange-bellied parrot, shorebird and nesting bird habitats).	Parks Victoria Melbourne Water CMAs Councils	Coastal Tender and Saltmarsh Protection Project PPWCMA Ramsar Protection Program Biodiversity Conservation and Ramsar Management Plan for the Western Treatment Plant	All
1.6 Identify and prioritise litter hotspots within the Ramsar site and undertake prevention and remediation activities.	EPA Victoria Parks Victoria Councils	Port Phillip Bay EMP	All coastal areas
1.7 Investigate options for addressing cumulative impacts of land use change and development on ecological character.	DELWP Councils	DELWP Wetland Buffer Guidelines Planning schemes	All
1.8 Develop advice to assist local government and other agencies to manage development within the Ramsar site buffers to protect the ecological character of the Ramsar site.	DELWP	DELWP Wetland Buffer Guidelines Planning schemes	All

Working together to protect Ramsar values

Trust for Nature has developed a Priority Zone Plan for the Bellarine Peninsula that includes mechanisms to maintain the ecological character of two segments of the Port Phillip Bay (Western Shoreline) and Bellarine Peninsula Ramsar Site: the Lake Connewarre complex and Swan Bay. The plan recognises inappropriate development and the associated pressures of pest plants and animals and increased recreational use as major threats to the Ramsar site.

Trust for Nature is a not-for-profit organisation that works to protect native flora, fauna and ecosystems on private land. Tools that they use to implement private land conservation include: legal agreements with private landowners via permanent conservation covenants on title; purchase of land supporting threatened habitats (and species) and protection of the land with conservation covenants before on-selling it via a Revolving Fund program.

In addition to working with local authorities and other natural resource management organisations to protect and improve conservation values across the Bellarine Peninsula, Trust for Nature has identified private properties greater than 10 hectares in size surrounding the Lake Connewarre complex as a priority for its private land conservation efforts and initiatives.

4.3 Theme 2: Adapting to climate change

Climate change was identified as a priority threat for management in the next seven years based largely on the effects of sea level rise on coastal vegetation communities (saltmarsh) as well as on habitat for shorebirds. Longer term impacts from increased frequency and intensity of storms were also considered a high priority threat.

Although it is not possible to directly influence the drivers of climate change in a management plan for a single Ramsar site, planning for resilience and adaptation to climate change is crucial and requires immediate action to maintain ecological character into the future. The issue of maintaining ecological character in a changing climate and with the inevitable changes in species distributions is being considered by the Convention (and in many other forums) both in Australia and internationally (Pittock et al. 2010, Gitay et al. 2011, Finlayson et al. 2013). Central to the management of the Port Phillip Bay (Western Shoreline) and Bellarine Peninsula Ramsar Site will be management of buffers and identification of locations where shoreline habitats (e.g. saltmarsh, intertidal flats) can migrate inland as sea levels rise. This may include incentive programs for private landholders adjacent to the Ramsar site.

Three management strategies have been identified to facilitate adaption to climate change (Table 8).

Table 8: Management strategies and responsible organisations for adapting to climate change.

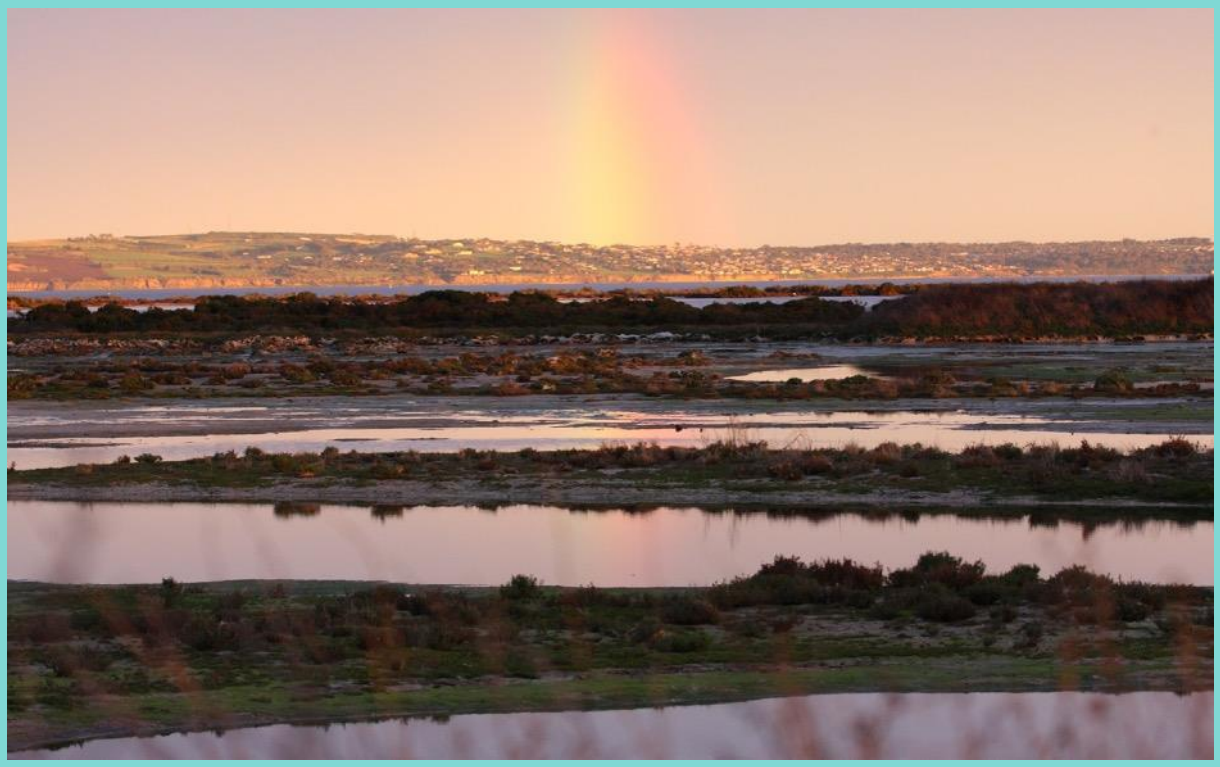
Management strategy	Responsibility	Linkages to existing programs / activities	Relevant locations
2.1 Identify and assess options for managing risk to coastal habitats (saltmarsh, seagrass and intertidal flats) from sea level rise and implement as appropriate.	DELWP Councils CMAs	Priority Zone Plan for Bellarine Peninsula DELWP Climate change vulnerability assessment and adaptive capacity of coastal wetlands	All
2.2 Identify opportunities for artificial habitat creation within and adjacent to the Ramsar site to compensate for potential habitat loss due to sea level rise and implement as appropriate.	DELWP CMAs	DELWP Climate change vulnerability assessment and adaptive capacity of coastal wetlands Western Treatment Plant Coastal Management Strategy	All
2.3 Identify sites at most risk from extensive shoreline erosion and implement appropriate interventions.	DELWP	Bellarine Peninsula - Corio Bay Local Coastal Hazard Assessment	Cheetham

Preparing for sea level rise: Western Treatment Plant Western Lagoon

During the 1960s the Melbourne Metropolitan Board of Works constructed a nine-pond lagoon for the treatment of sewage – the Western Lagoon – over 40 hectares of coastal saltmarsh. This location's remaining coastal saltmarsh and sedgefields later became a key overwintering area for the critically endangered orange-bellied parrot and habitat for other listed species, such as Lewin's rail and Altona skipper butterfly. But the presence of sewage ponds degraded adjacent habitat through the constant seepage of freshwater.

Therefore, when the Western Lagoon was decommissioned as a sewage treatment system in 2004 planning began to rehabilitate the site by restoring tidal exchange and consequently re-establishing coastal saltmarsh in several of the former sewage ponds. This major project was also planned as a test of the effectiveness of coastal 'retreat' or 'adaptation'. It was seen as an opportunity to learn how the land and vegetation responded to the removal of bunds and tidal inflows across former constructed assets. Ponds 4 and 5 (12 ha) were cleaned of sludge and breached to the sea during 2010. Pond 6 and part of Pond 7 (4 ha) were treated similarly during May 2016.

Results have been exceptionally promising. Coastal saltmarsh plants are re-establishing themselves and the former ponds were highly attractive to migratory shorebirds for a period before the vegetation started to establish. There have been no worrying areas of gully type erosion.



Early restored coastal saltmarsh at Western Lagoon, a former sewage treatment pond system, (Photograph: Chris Lunardi, Melbourne Water).

4.4 Theme 3: Managing water quality and water regimes

Priority threats associated with water quality are related to nutrients, sediments and toxicants from catchment inflows and stormwater. The greatest threat was to the Lake Connewarre complex, with discharges of stormwater directly from adjacent urban development impacting on the salinity of the system. There is already evidence of flow on effects to biota with changes in vegetation communities and a potential localised loss in condition and extent of saltmarsh. Toxicants in the form of chemicals of emerging concern such as pharmaceuticals discharged in treated wastewater form the Western Treatment Plant, were identified as a knowledge gap.

With respect to water regimes, there are several locations within the Ramsar site, where water regimes are maintained artificially, such as at Cheetham Wetlands, the Western Treatment Plant and smaller areas such as Snake Island in the Point Wilson / Limeburner's Bay sector. These water regimes need to be continually monitored and managed to maintain ecological character. Finally, water regimes at the freshwater Reedy Lake are now augmented by environmental water allocations (see case study below).

Five management strategies have been identified to manage water quality and water regimes (Table 9).

Table 9: Management strategies and responsible organisations for manage water quality and water regimes.

Management strategy	Responsibility	Linkages to existing programs / activities	Relevant locations
3.1 Continue to implement the actions in the Melbourne Water Stormwater and Corangamite Waterway strategies aimed at managing nutrient, sediment and toxicant discharges to the Ramsar site.	Melbourne Water CCMA	Healthy Waterways Strategy 2018 Corangamite Waterways Strategy Integrated Water Management Framework	All
3.2 Maintain appropriate concentrations and loads of nutrients (nitrogen and total organic carbon) in Western Treatment Plant discharges to adjacent intertidal mudflats to support ~12,000 shorebirds over summer.	Melbourne Water	Monitoring for a specific management objective: protection of shorebird foraging habitat adjacent to a waste water treatment plant	Werribee
3.3 Continue to adaptively implement water regime management in artificial habitats within the Ramsar site.	Melbourne Water Parks Victoria	Cheetham Wetlands Hydrology Manual Environmental flow recommendations of recycled water to support significant biodiversity values at the Western Treatment Plant	Cheetham Werribee Pt Wilson (Snake Island)
3.4 Continue to develop and implement environmental water management at Reedy Lake and Hospital Swamp.	CCMA Parks Victoria	Barwon Wetlands Seasonal Watering Proposals	Lake Connewarre complex
3.5 Assess the risk to water quality in Swan Bay from inflowing streams.	EPA Victoria City of Greater Geelong		Swan Bay

Reedy Lake: Restoring wetting and drying

Reedy Lake was once (before being part of the Ramsar site) an intermittent wetland system that naturally had cycles of wet and dry. Since the 1970s, however, the lake remained almost permanently inundated. This altered the soil and water chemistry allowing the extent of tall reed communities to nearly double. While reed beds form an important part of the lake's ecosystem, their continued expansion reduced habitat diversity as they took over areas that previously supported different vegetation types and open water. In turn, this reduced the diversity of fauna such as waterbirds and frogs that could be supported by the wetland.

The Corangamite CMA, together with DELWP, the Victorian Environmental Water Holder and community groups, has developed and is currently implementing a scientifically validated four year environmental water management regime at Reedy Lake that allows the system to periodically dry. The new regime involves delivering water in winter/spring and then lowering water levels over summer until the Barwon River level increases in autumn. The intent of implementing this new regime is to reduce the extent of tall reeds and restore the ecological health of Reedy Lake.

Although this program has been going for just one year (instigated in 2016/17) there are already signs of improved ecosystem health. As part of implementing the new watering regime, a monitoring program has been established to determine the ecological response (GHD, 2017 unpublished draft). This project is designed to monitor the influence of the new watering regime on flora, fauna and surface/groundwater quality. Early results indicate an improvement in wader habitat and coastal saltmarsh, while also identifying that the drying regime did not generate acid sulphate soils.

4.5 Theme 4: Improving our understanding

Port Phillip Bay is a well-studied environment and there has been a long history of environment studies of the Bay and its values. Despite this, 10 priority knowledge gaps were identified during the development of the RMP (section 3.4). Some of these are addressed through monitoring activities (see section 5) and five management strategies have been developed to address the remainder (Table 10).

Table 10: Management strategies and responsible organisations for improving our understanding.

Management strategy	Responsibility	Linkages to existing programs / activities	Relevant locations
4.1 Investigate the risks to ecological character from micro-plastics	EPA Victoria	Port Phillip Bay EMP	All shoreline locations
4.2 Investigate the risks to waterbirds and fish associated with aerial spraying for mosquitoes in intertidal habitats	City of Greater Geelong EPA Victoria		Swan Bay, Point Wilson, Lake Connewarre complex
4.3 Improve our understanding of the effects of chemicals of emerging concern on ecological character	EPA Victoria Melbourne Water	Port Phillip Bay EMP	Werribee / Avalon
4.4 Assess the impact of duck hunting on disturbance of non-target species, particularly shorebirds and orange-bellied parrot.	DELWP	Current project assessing impacts of disturbance on waterbirds from duck hunting (DELWP, DEDJTR, GMA)	Lake Connewarre complex, Werribee / Avalon, Point Wilson / Limeburner's Bay
4.5 Investigate the threats from, and potential mitigations actions for, avian diseases in the Ramsar site.	DELWP EPA Victoria		Werribee / Avalon, Mud Islands

Mud Islands (PPWCMA).

4.6 Theme 5: Communication, Education, Participation and Awareness (CEPA)

The Ramsar Convention's Program on Communication, Education, Participation and Awareness (CEPA) was established to help raise awareness of wetland values and functions. The CEPA Program calls for coordinated international and national wetland education, public awareness and communication. The Program also encourages the promotion of training in the fields of wetland research and management.

While there are some excellent CEPA programs already in place in the Port Phillip Bay (Western Shoreline) and Bellarine Peninsula Ramsar Site, the lack of awareness in the broader community of wetland values and the Ramsar Convention was raised by the Stakeholder Advisory Group and Steering Committee as a significant issue for the site (see text box below).

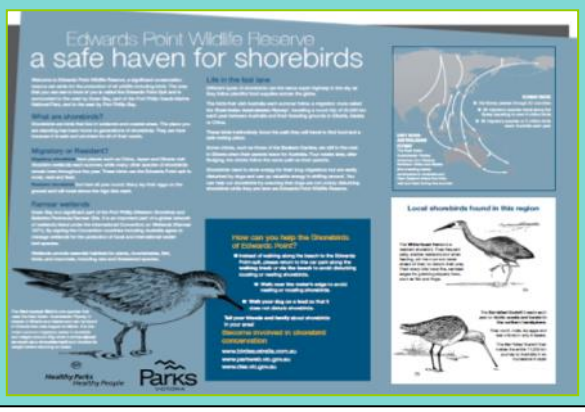
Three management strategies have been identified to improve CEPA (Table 11).

Table 11: Management strategies and responsible organisations for CEPA.

Management strategy	Responsibility	Linkages to existing programs / activities	Relevant locations
5.1 Develop and implement a Port Phillip Bay Ramsar site wetland information and interpretation program.	PV DELWP Councils CMAs	Port Phillip Bay EMP	All
5.2 Work with Aboriginal groups to improve understanding of Aboriginal values associated with the Ramsar site and develop opportunities for Aboriginal involvement in Ramsar site management.	CMAs DELWP PV	Wetland Wardens Port Phillip Bay EMP DELWP Aboriginal Inclusion Plan 2016	All
5.3 Build capacity and collaboration with community and industry groups by supporting citizen science and on-ground community action in Ramsar site management.	CMAs DELWP PV NGOs	PPWCMA Ramsar Protection Program Port Phillip Bay EMP	All

Understanding attitudes towards Port Phillip Bay (Western Shoreline) and Bellarine Peninsula Ramsar Site

Parks Victoria and the Port Phillip and Westernport CMA commissioned a study on attitudes to Ramsar site values in Port Phillip Bay, with targeted interviews of over 400 residents that live near the Port Philip Bay (Western Shoreline) and Bellarine Peninsula Ramsar Site. The study found that while a large proportion of interviewees regularly used parts of the Ramsar site for recreation, less than 15 % were aware of the term “Ramsar”. The results of the study were used to implement a program designed to increase community awareness of the values of Ramsar sites and their importance in a global context.



5 Monitoring

5.1 Framework

Consistent with the *Victorian Waterway Management Strategy* (VWMS), the Ramsar Convention and the Australian Ramsar Management Principles, this RMP adopts an adaptive management approach. The RMP sits within the broader framework of the VWMS (Department of Environment and Primary Industries 2013) as a component of regional waterway management planning (Figure 5). The RMP will be renewed every seven years and is underpinned by a monitoring program that reports on the condition of the system with respect to change in ecological character and progress towards meeting RCTs.

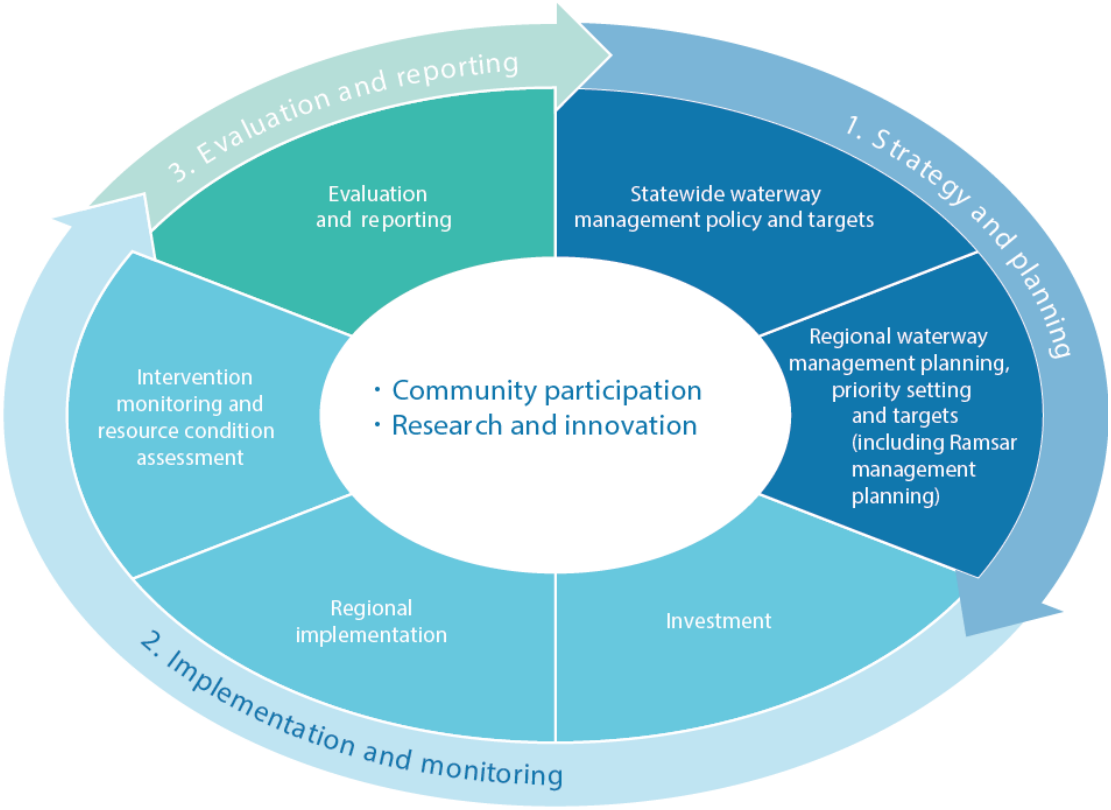


Figure 5: The adaptive management cycle of the Victorian Waterway Management Program, noting that this Ramsar management plan is a part of the regional waterway management planning process (adapted from Department of Environment and Primary Industries 2013).

5.2 Condition monitoring

Monitoring recommendations to assess progress towards RCTs and change in ecological character (i.e. evaluate critical components, processes and services against LAC) are provided in Table 12. Consistent with the principles of the RMP, responsible agencies have been identified, as have links to existing, relevant programs. It should be noted that many of the existing programs have limited funding and timelines and a full assessment of ongoing monitoring against monitoring needs will be required as part of implementation planning. To this end, DELWP is developing a Monitoring Evaluation Reporting and Improvement (MERI) framework for the management of Ramsar sites across Victoria.

Melbourne Water Ramsar Monitoring Program

The 1996 Port Phillip Bay Environmental Study recommended a reduction in nitrogen to ensure the health of the bay. To achieve this Melbourne Water significantly upgraded the Western Treatment Plant to remove more nitrogen and improve the quality of the water discharged to Port Phillip Bay. To manage the impacts on biodiversity, a Strategic Compliance Plan was put in place in 2003. That plan set the goals to research, monitor and manage any impacts of the environmental improvement project on EPBC-listed Matters of National Environmental Significance, including Ramsar. The plan has gone through several audits and reviews, and represents over a decade of monitoring and adaptive management aimed at maintaining the ecological character of this section of the Ramsar site. The plan targeted six populations:

- Growling grass frog
- Migratory shorebirds
- Waterfowl
- Pied cormorant
- Straw-necked ibis
- Whiskered tern

The plan describes monitoring methods, sets quantitative management triggers and provides recommended management actions in the event that a management trigger is reached. Since 2003, Melbourne Water has commissioned over 150 planning, research, monitoring and evaluation projects covering everything from orange-bellied parrot habitat, to intertidal infauna, tracking of growling grass frogs to waterbird abundance and population dynamics.

In response to the outcomes of these projects, Melbourne Water has implemented extensive on-ground works associated with wetland habitat at the Western Treatment Plant. Highlights include the following:

- Significant areas were set aside to provide precautionary “compensatory” habitat for waterbirds and growling grass frogs. These include three large decommissioned sewage treatment lagoons: Lake Borrie, Western and T-Section; the Austen Road ponds, Paradise Road pond; and a number of other ‘habitat ponds’ to provide high tide foraging areas for migratory shorebirds, including 270S Borrow Pit, 35E Pond 8, 35E Pond 9, 95E South Pond, 95E North Pond, 115E Borrow pit and associated cells, and 5W Ponds 9 to 11.
- Contingency planning provided for rapid responses to any observed impacts on significant biodiversity values during the construction phase of the EIP, such as a re-introduction of sewage to Lake Borrie,
- Comprehensive Site Environmental Management Plans were prepared and enforced during all construction works
- Smaller multiple outlets were trialled and then later installed to ensure nutrients are provided directly to shorebird foraging intertidal zones, and protecting them against lower flows during drought periods.

Table 12: Monitoring requirements for the Port Phillip Bay (Western Shoreline) and Bellarine Peninsula Ramsar Site.

Program	Responsibility	Linkages to existing programs / activities	Locations
Water quality	EPA Victoria Melbourne Water	Current water quality monitoring by EPA and Melbourne Water	All
Seagrass	Parks Victoria DELWP	Ball et al. (2014) mapped seagrass communities at Swan Bay and Mud Islands	Swan Bay, Mud Islands, Pt Wilson
Saltmarsh and mangrove	DELWP Parks Victoria CMAs	Boon et al. (2011) mapped saltmarsh communities.	All
Freshwater aquatic vegetation	CCMA	Seasonal Watering Proposals	Lake Connewarre complex
Waterbird abundance	DELWP Parks Victoria	Current: Shorebirds 2020 Annual summer waterfowl	All
Waterbird breeding	DELWP Parks Victoria		Werribee Mud Islands
Threatened bird species: Orange-bellied parrot	DELWP		Werribee Lake Connewarre complex
Threatened bird species: Australasian bittern	DELWP	Threatened species recovery programs	Werribee
Threatened species: Growling grass frog	Melbourne Water	Melbourne Water EPBC compliance	Werribee
Native fish: abundance and trends	CCMA Parks Victoria	Parks Victoria Marine National Parks Monitoring Program	Swan Bay Lake Connewarre

5.3 Intervention monitoring

Intervention monitoring assesses the effectiveness of management actions in achieving desirable or stated outcomes and is an important part of an adaptive management approach. While there is solid scientific evidence for some management actions other management actions often lack sufficient scientific evidence to indicate outcomes and decisions are made on assumptions and expert opinion.

A targeted intervention monitoring and evaluation program will be developed as part of implementation planning to assess the effectiveness of management actions in terms of measureable effects on ecosystem condition, rather than just operational outputs (e.g. determining the effectiveness of a given management activity on nest success instead of simply reporting the number of baits or traps set for predators). The results of intervention monitoring will be used to inform future management actions so that the most effective and efficient programs are implemented to maintain the ecological character of the Ramsar Site. The site will have a monitoring, evaluation, monitoring and improvement (MERI) plan to guide this process.

5.4 Evaluation and reporting

The Ramsar Rolling Review is designed to assess the status of the ecological character of Ramsar sites in Australia every three years (in line with international reporting requirements). An assessment of Victoria's Ramsar sites was conducted in 2015 – 2016 (DELWP unpublished). This process collates information across monitoring and management projects in Ramsar sites to assess against Limits of Acceptable Change (LAC). The output is an evaluation of ecological character and a report to site managers, DELWP and the Australian Government. This process fulfils the requirements of reporting for the Ramsar Convention.

A committee will oversee the implementation of the RMP and will coordinate monitoring and evaluation of the plan (see Section 6.2) as per the site MERI plan (see Section 5.3), this will include reporting against RCTs. The committee will oversee the development of annual actions plans that will track activities and outputs from year to year.

6 Governance and implementation

6.1 Governance

Coordination of Ramsar site management in Victoria is the responsibility of the Victorian Government, through DELWP. This RMP is an integral component of a continuing program to develop and implement a current management framework for Victoria's Ramsar sites.

Central to this, and the management of all Ramsar sites, is the involvement of stakeholders and the broader community in the management of the site. A broad range of stakeholders participated in the development of this plan (see Appendix A of full plan) and several public forums were held during the public consultation period. The Communication, Education, Participation and Awareness (CEPA) activities in Theme 5 (see section 4.6) will be augmented by regular opportunities for all stakeholders with an interest in the management of the site to become involved and be kept informed.

6.2 Ramsar Coordinating Committee

A Ramsar Coordinating Committee comprising representatives of key stakeholder groups will be convened. This integrated approach builds on previous and current collaboration practice in the region, evident most recently in the strong participation of delivery partners in the development of the RMP.

The Ramsar Coordinating Committee will be responsible for coordinating specific aspects of implementation within the themes of the RMP. These responsibilities will include developing:

- annual action plans
- targeted investment proposals
- integrated delivery arrangements
- coordinated monitoring and evaluation of implementation, including integrated reporting against targets, and
- reviewing Management Plan progress bi-annually.

6.3 Resourcing implementation

Investment proposals to support actions of RMP will be developed as investment opportunities arise. Project investment proposals will be prepared through the Ramsar Coordinating Committee in conjunction with delivery partners and will be structured to reflect the themes within the RMP, and the regional programs of partner managing agencies.

Implementation of the RMP will be influenced by available funding and resources. The implementation approach will ensure coordination and prioritisation of management actions so that maximum benefit is achieved with the resources that are available.

Annual priorities and programs will be developed to best match the funding cycles of investors. Throughout the implementation of the RMP, the Ramsar Coordinating Committee will work to use the best available information tools to support the establishment of annual priorities.

Partners will seek funding for implementation of this plan through the:

- Victorian Waterway Management Program
- relevant initiatives of the State and Federal Governments
- existing agency budgets, and
- contributions of industries and communities.

6.4 Ramsar administration

The development of the plan identified a number of administrative matters to resolve. These are described, with a brief rationale in Table 13.

Table 13: Matters related to the administering of the Ramsar Convention and the Port Phillip Bay (Western Shoreline) and Bellarine Peninsula Ramsar Site.

Management strategies	Responsibility	Rationale
6.1 Review the Ramsar site boundary.	DELWP DoEE Ramsar Coordinating Committee	The Ramsar site boundary was delineated at the time of listing in 1982 and more recently described in detail (DEPI 2013). Since 1982, there have been some changes to land management and an increased understanding of the aquatic ecosystems in the region and their values. A review of the boundary to consider the addition of adjoining areas is proposed.
6.2 Apply the appropriate State and Commonwealth environmental impact assessment processes for activities that have the potential to impact on the Ramsar site and otherMatters of National Environmental Significance (MNES).	DELWP DoE Ramsar Coordinating Committee	Under the EPBC Act, actions that have, or are likely to have, a significant impact on a MNES require approval from the Australian Government Minister for the Environment (the Minister). The responsibility for referral of an action lies with the proponent. The Minister decides whether assessment and approval is required under the EPBC Act. Ramsar sites are one of the nine MNES and so assessments would be required for any activity that is likely to impact on the ecological character of the site, whether inside the site or in the catchment. The text box on the next page explains the process for assessing major projects.
6.3 Undertake a regular review of the status of the ecological character of the Ramsar site. This review should include new and emerging issues as well as the current listed values and threats.	DELWP	An assessment is undertaken every three years and reports on the status of ecological character of the Ramsar site. As new knowledge on the values and threats within the Ramsar site becomes available (e.g. new species supported in a changing climate), this should be incorporated into the sites ecological character and management planning. Site status reports are provided at the Water and Aquatic Ecosystems Sub-committee meetings, a national forum focussed on implementation of the Ramsar Convention.
6.4 Update the 1993 management plan for the Lake Connewarre State Game Reserve	DELWP, CCMA, PV	The management plan for the Lake Connewarre State Game Reserve is over two decades old and is in need of renewal.
6.5 Develop action plans for this strategy.	Ramsar Coordinating Committee	This plan has identified high level strategies for a number of agencies. An annual action plan, based on a formal prioritisation process and available resources is required on an annual basis. These action plans will explicitly consider intervention monitoring and monitoring to assess progress towards RCTs as part of an adaptive management program.

Changing the boundary of a Ramsar site

The Victorian Waterway Management Strategy (Department of Environment and Primary Industries 2013) contains a clear policy for nominating new Ramsar sites and changing the boundary to existing sites. The Australian Government makes the final decision regarding the listing of a new Ramsar site or extending the boundaries of an existing site and requires the endorsement of the Victorian Government. National guidance outlines the process for listing a new Ramsar site and the ongoing obligations and administrative requirements. DELWP is responsible for assessing the evidence for any proposal to list a new Ramsar site or extending the boundaries of an existing site.

Extending the boundary is a formal and protracted process and the benefits of boundary extensions must be weighed against the value of allocating resources to on-ground actions or other activities.

Policy 12.6

Investigations to list a new Ramsar site or extend the boundaries of an existing site may be initiated in response to proposals by the community or other parties and will consider the following factors:

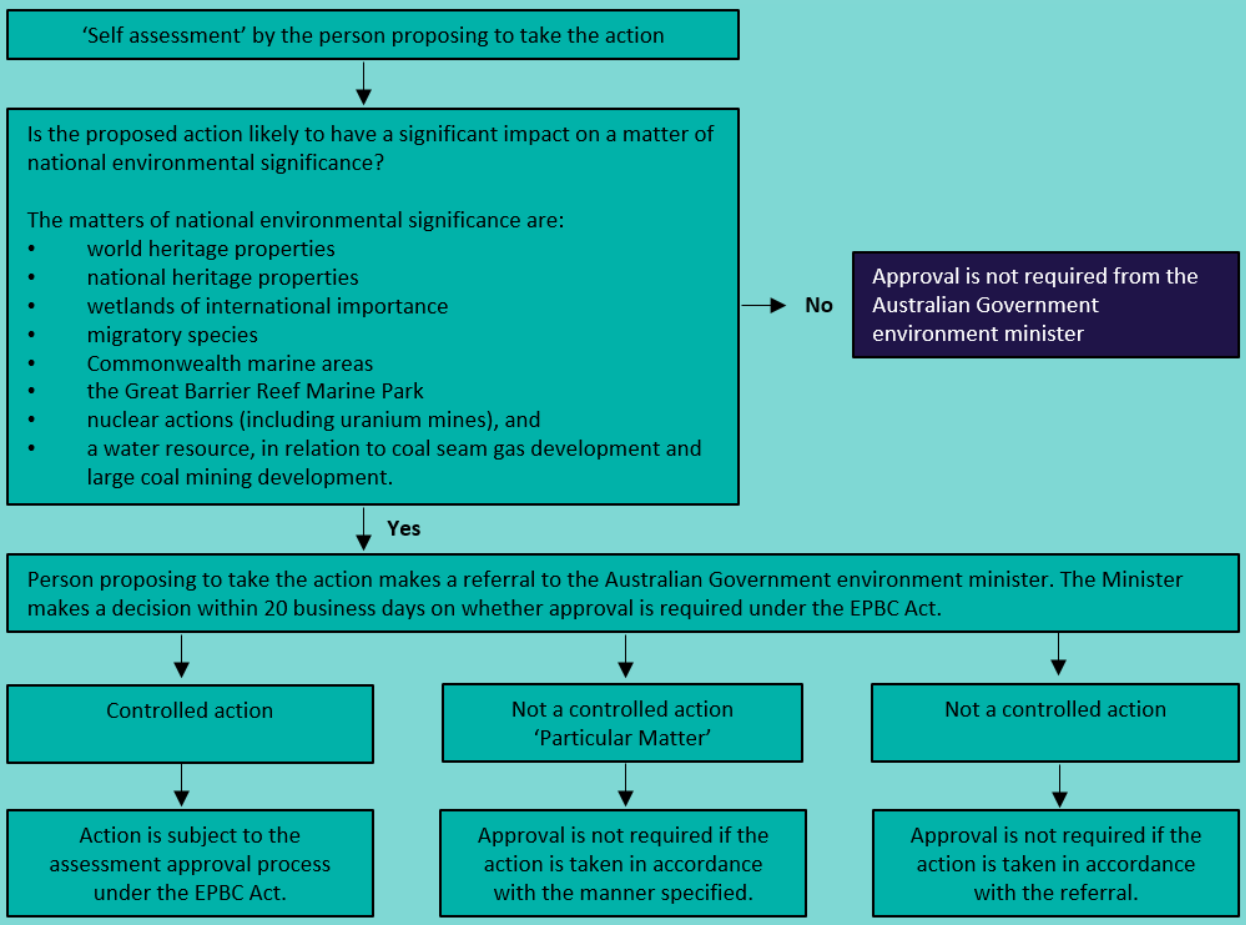
- the Ramsar Convention criteria for identifying wetlands of international importance met by the wetland
- the Ramsar Convention *Strategic Framework and guidelines for the future development of the List of Wetlands of International Importance of the Convention on Wetlands* and any national strategic direction on priorities for Ramsar site listing
- agreement by the land manager and key stakeholders involved in the management of the wetland and the actions they propose to meet relevant Ramsar obligations
- the current degree of protection of the wetland and the opportunities for increasing the level of protection by listing the wetland as a new Ramsar site
- alternative legislative and management frameworks for management of the wetland
- the level of threat to the wetland, and the contribution that listing would make to improving the management of threats
- the feasibility and cost-effectiveness of maintaining the ecological character of the wetland in the long-term
- the contribution that listing would make to awareness raising and community education in relation to the values of the wetland and wetland conservation in general
- the level of community support for listing
- the national and international documentation and administrative requirements.

The Victorian Government will recommend listing of a new Ramsar site or extending the boundaries of an existing site to the Australian Government where:

- there is agreement by the owner or manager of the wetland
- there is compelling evidence that listing will provide clear benefits in:
  - protecting highly significant wetland values relating to the Ramsar criteria for listing
  - raising the wetland profile
  - increasing the level of support for conservation and wise use measures that cannot be achieved through other mechanisms.

Assessing the impact of major projects on Ramsar sites

Under the EPBC Act, a person must not take an action that has, will have or is likely to have a significant impact on any of the matters of environmental significance without approval from the Australian Government Minister for the Environment. In this context, an 'action' is a project, a development, an undertaking, an activity or a series of activities, or an alteration of any of these things. The EPBC Act referral process comprises several steps:



Although the EPBC referral process begins with "self assessment" there are strict penalties for not referring an action. A person who takes an action that is likely to have a significant impact on a matter of national environmental significance, without first obtaining approval, can be liable for a civil penalty of up to $900,000 for an individual and $9 million for a body corporate, or for a criminal penalty of seven years imprisonment.

DELWP administers the statutory environmental impact assessment system for major projects in Victoria with potentially significant environmental effects. This includes referrals to the Minister for Planning for Environmental Effects Statements (EES) under the *Environment Effects Act 1978* as well as assessment and approvals for major transport projects under the *Major Transport Projects Facilitation Act 2009*. In addition, Victoria has a bilateral agreement with the Commonwealth for environmental impact assessments that avoids duplication of assessment processes. It essentially allows the Commonwealth to use the assessments made by Victoria to inform decisions about impacts to matters of national environmental significance (which includes Ramsar sites) under the EPBC Act.

This is a very simplified summary of the process, for more information see the following of the DELWP website: http://delwp.vic.gov.au/planning/environmental-assessment#sthash.WiF9gy5u.dpuf and the Australian Government Department of Environment http://www.environment.gov.au/protection/environment-assessments/assessment-and-approval-process

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