

Glenelg Estuary and Discovery Bay Ramsar Site

Management Plan Summary



Acknowledgements

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Photo credit

Glenelg Estuary looking east along Discovery Bay, October 2015, © Marcel Hoog Antink

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Abbreviations

CAMBA	China Australia Migratory Bird Agreement
CMA	Catchment Management Authority
DEDJTR	Department of Economic Development, Jobs, Transport and Resources (Victorian Government)
DELWP	Department of Environment, Land, Water and Planning (Victorian Government), formerly Department of Environment and Primary Industries
DEPI	Department of Environment and Primary Industries, now Department of Environment, Land, Water and Planning
DEWHA	Department of Environment, Water, Heritage and the Arts, now the Department of the Environment and Energy (Australian Government)
DoEE	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
Glenelg Hopkins CMA	Glenelg Hopkins Catchment 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
MER	Monitoring, Evaluation and Reporting
PSC	Project Steering Committee
RCT	Resource Condition Target
RIS	Ramsar Information Sheet
RSMP	Ramsar Site Management Plan
ROKAMBA	Republic of Korea Australia Migratory Bird Agreement
SRW	Southern Rural Water
TAG	Technical Advisory Group
VWMS	Victorian Waterway Management Strategy

1 Introduction

This Ramsar Management Plan (RSMP) has been prepared as part of the nomination process for listing the Glenelg Estuary and Discovery Bay wetlands under the Ramsar Convention. It is intended that this document, together with the Ecological Character Description (ECD) guide the management, conservation and maintenance of the ecological character and wise use of the site. A consultative and collaborative process was undertaken develop the RSMP. The outputs of this process are documented in two products:

1. A Glenelg Estuary and Discovery Bay Ramsar Site Management Plan, including a full description of the plan's development and technical appendices, and
2. A Glenelg Estuary and Discovery Bay 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 listed 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'. The Ramsar Convention has defined "ecological character" and "change in ecological character" as (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 Ramsar site management plan 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. How this management plan fits in to the broader framework is illustrated in Figure 1.

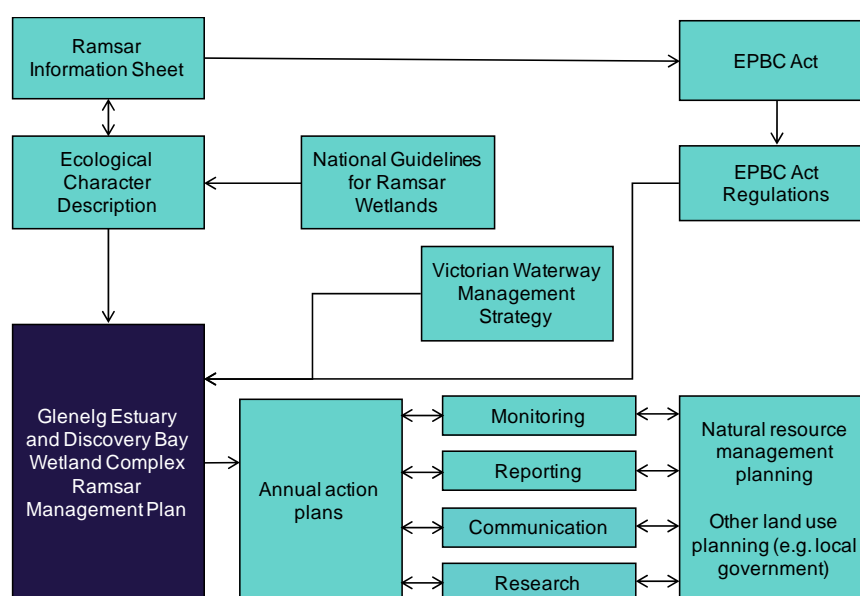


Figure 1: The Glenelg Estuary and Discovery Bay Ramsar Site in context of other requirements for the management of Ramsar sites (adapted from DEWHA 2008).

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 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 Glenelg Estuary and Discovery Bay 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 Glenelg Estuary and Discovery Bay Ramsar Site supports over 30 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 intertidal flats 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 waders when roosting or feeding may result in a significant loss of energy. This may even compromise their ability to build up enough reserves to complete the return journey to breeding grounds. Disturbance of migratory shorebirds may occur as a result of driving on beaches or in saltmarsh and intertidal areas, unleashed dogs, recreational fishing (in some instances); boating and jet skiing and any activity in the intertidal zone that causes significant noise or light. Migratory waders are also susceptible to predation by 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 Glenelg Estuary and Discovery Bay wetlands need to work together to help protect and conserve these important species.

1.1.2 Objectives of the plan

The primary purpose of the Glenelg Estuary and Discovery Bay Ramsar Site Management Plan (Glenelg RSMP) 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 Glenelg Estuary and Discovery Bay wetlands support a number of ecological, socio-economic and cultural values. 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 Glenelg RSMP is:

“To maintain, and where necessary improve, the ecological character of the Glenelg Estuary and Discovery Bay Ramsar Site and promote wise and sustainable use”.

1.2 About this management plan

The Glenelg RSMP was developed through a consultative process that involved a large number of stakeholders with an interest in the Glenelg Estuary and Discover Bay wetlands. This included a series of workshops and briefings that ensured that local knowledge and best-available scientific information was included in both the ECD and this plan. The guiding principles for the development of the Glenelg RSMP included:

- Stakeholder involvement – this plan has been developed with the input of a broad range of stakeholders through every phase. This consultation included traditional owners, agencies with a role in management of the site, technical experts, non-government organisations and the general community.
- Evidence-based approach – best available knowledge has been used to underpin the development of this plan including the risk assessment and prioritisation of values and threats.
- Precautionary principle – lack of full scientific certainty was not seen 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 region, catchment and site to maintain and improve condition and ecosystem services. This plan seeks to build on these existing activities rather than duplicate effort.
- Adaptive management – the plan life is for eight years, with a mid-term review after four years. A monitoring program has been included and the principles of monitor, evaluate, report and improve have been adopted.

2 Glenelg Estuary and Discovery Bay Ramsar Site

A complete description of the ecological character of the Glenelg Estuary and Discover Bay Ramsar Site is contained in the ecological character description (ECD) (Butcher et al. 2017). A summary of this information relevant to the management plan for the site is provided below.

2.1 Location and land management

The Glenelg Estuary and Discovery Bay wetlands are situated in western Victoria in the Glenelg Hopkins Catchment Management Area. The region supports various agricultural industries (e.g. livestock grazing, soft and hardwood plantations), and includes major population centres at Portland and Hamilton in Victoria and Mount Gambier in South Australia. The site is located adjacent to the Victorian-South Australian border, approximately 430 kilometres west of Melbourne (Figure 2). Nelson is the township closest to the Ramsar site (Figure 3).

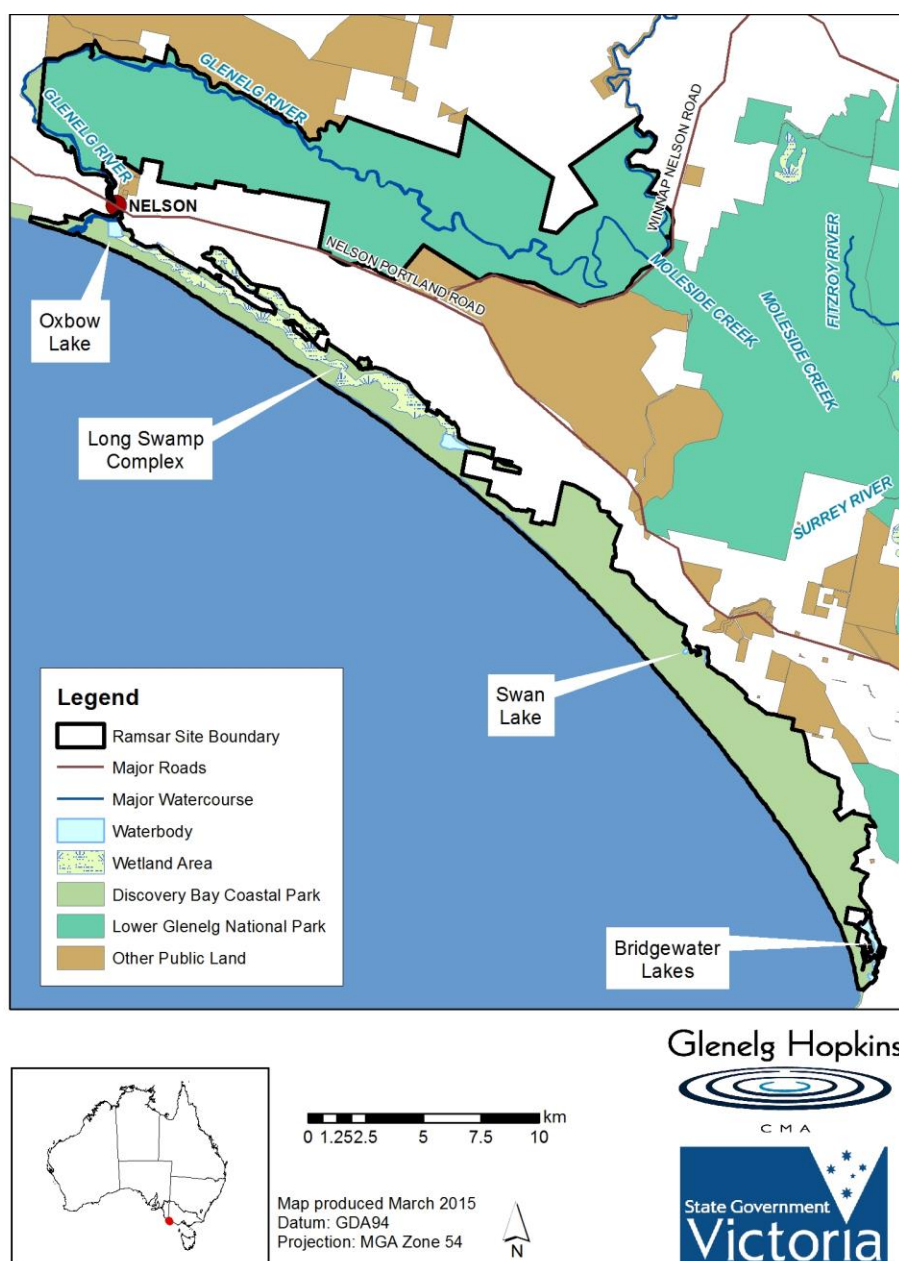


Figure 2: Location of the Glenelg Estuary and Discovery Bay Ramsar site.

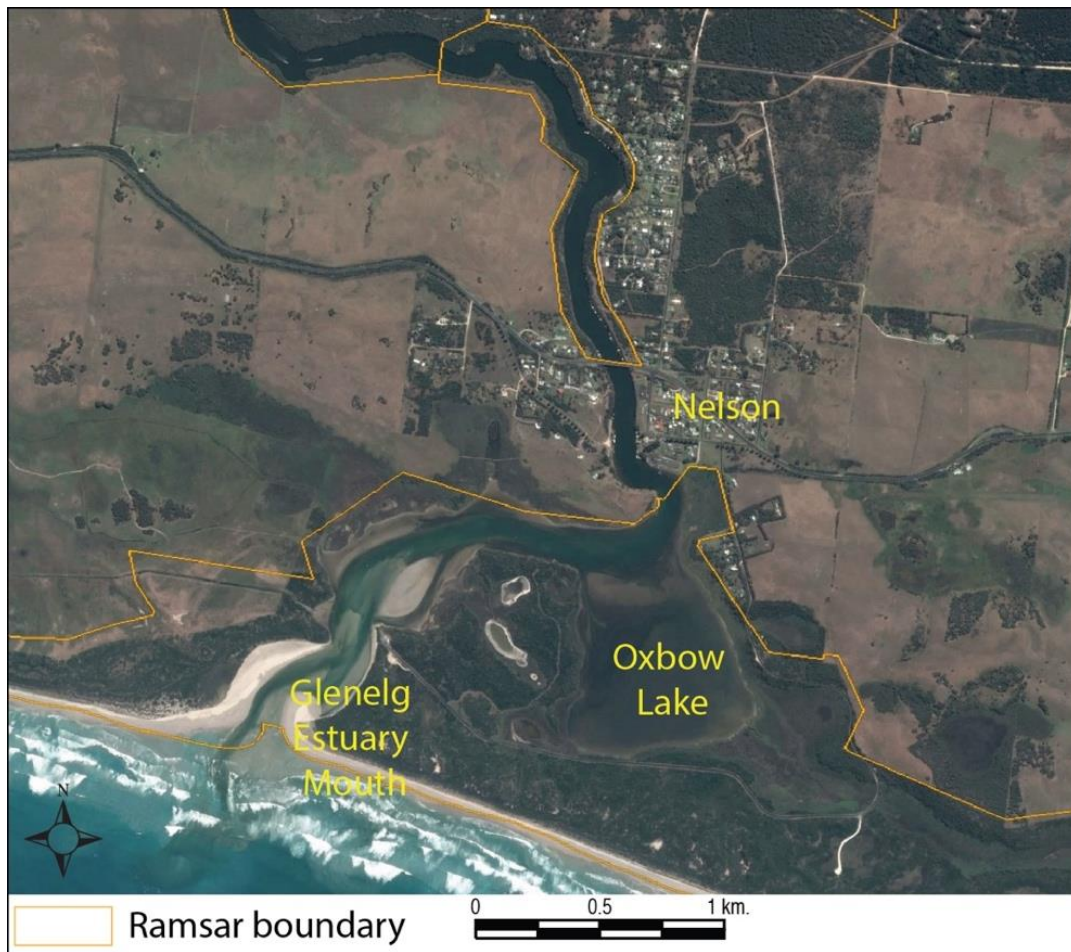


Figure 3: Close-up of Ramsar site boundary near the town of Nelson, showing the 600m stretch of river exclude from the boundary, the estuary mouth and Oxbow Lake.

The Ramsar site covers approximately 22,289 hectares and comprises the western part of Lower Glenelg National Park from the South Australian border to the Nelson - Winnap Road, most of the Discovery Bay Coastal Park and the Nelson Streamside Reserve. The boundary excludes the portions of the Glenelg Estuary that lie within South Australia as well as 600 metres of the estuary channel adjacent to the town of Nelson (see Figure 3). More detail is provided in the Boundary Description for the Site (Brooks, 2015).

Major land uses adjacent to the site include forestry (primarily pine plantations) and grazing of improved and natural pastures. Both the National Park and Coastal Park are managed by Parks Victoria in partnership with local stakeholders (Parks Victoria 2015).

The Ramsar site has three main systems (management units) represented by wetlands within freshwater, estuarine and beach environments:

1. The Long Swamp wetlands, Bridgewater Lakes and other freshwater systems along approximately 50 kilometres of the Discovery Bay Coastal Park (Freshwater wetlands management unit).
2. The Glenelg Estuary and associated Oxbow Lake and streamside reserve at the township of Nelson (excluding the Crown Land Reserve in the immediate vicinity of Nelson), along with the western part of the Lower Glenelg National Park from the South Australian border to the Nelson - Winnap Road and excludes the Moleside Creek portion of the national park (Estuary management unit).
3. The dune fields and beach down to the low water mark along the Discovery Bay Coastal Park (Beach and dune field management unit), extending from the South Australian border to Discovery Bay Road.

2.2 Ramsar listing criteria

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. The Glenelg Estuary and Discovery Bay wetlands meet five of the nine Ramsar listing criteria (Table 1).

Table 1: Ramsar criteria currently met by the Glenelg Estuary and Discovery Bay Ramsar Site.

Criteria	Justification
1. Contains a representative, rare, or unique example of a natural or near-natural wetland type found within the appropriate biogeographic region	This site meets this criteria through its unique combination of geomorphological features (dune slacks) and wetland types, including groundwater dependent ecosystems which include several of which are recognised as globally threatened wetland types: fens, wet grasslands and temporary pools.
2. Supports vulnerable, endangered, or critically endangered species or threatened ecological communities	The site regularly supports a threatened ecological community, two species of threatened plant and six threatened animal species listed under the EPBC Act and / or IUCN Red List:
4. Supports plant and/or animal species at a critical stage in their life cycles, or provides refuge during adverse conditions	The site meets this criterion for supporting migratory species of waterbirds and fish and by acting as a drought refuge during adverse conditions. Specifically, the site provides habitat for 95 waterbird species including 24 species listed under international migratory bird agreements. Native fish populations include 14 species which are diadromous, migrating between habitats for part of their lifecycle.
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.	The site provides a range of fish species with sources of food, spawning grounds and nurseries, and acts as a migration path on which diadromous fishes of the region depend.
9. Regularly supports one percent of the individuals in a population of one species or subspecies of wetland-dependent non-avian animal species.	The site meets this criterion for the ancient greenling (<i>Hemiphysalis mirabilis</i>). The sub-population at Long Swamp likely represents more than 1% of the total population for this species.

2.3 Values

The Ecological Character Description for the Glenelg Estuary and Discover Bay Ramsar Site (Butcher et al. 2017) identified components, processes services (CPS) that are critical to the ecological character of the Ramsar site. These are described briefly in Table 2. More detail on each of the critical CPS can be found in the ECD for the site.

Table 2: Summary of the values of the Glenelg Estuary and Discovery Bay Ramsar Site.

Value	Description
Hydrology	<p>While a knowledge and quantification of ecosystem water regimes is limited, it is understood that many of the wetlands in the site, including the Glenelg Estuary are groundwater dependent. It is suspected that groundwater is a significant water source for these systems, at times contributing more than surface water sources.</p> <p>The hydrology of the Glenelg Estuary is influenced by the tidal cycle, when the estuary is open and freshwater river inflows, the latter of which are seasonal.</p> <p>A range of wetland water regimes are present and several of the wetlands, such as the Bridgewater Lakes are permanently inundated.</p>
Vegetation – type and extent	<p>Nationally threatened coastal saltmarsh is present at Oxbow Lake.</p> <p>Freshwater sedgeland and tall marsh vegetation extend across the Long Swamp wetlands</p> <p>Lake bed macrophytes - submerged macrophyte communities are a characteristic of the permanent lakes, and the Bridgewater Lakes supports a charophyte community, although the diversity and extent of this association is a knowledge gap for the site.</p>

Value	Description
Fish – diversity and abundance	<p>Fifty-three native fish species from 29 families have been recorded in the site, 28 of which are considered to be regularly supported.</p> <p>This includes fish with a range of life-history strategies including freshwater, estuarine, marine and diadromous species that move between habitats.</p> <p>The site provides feeding, spawning and nursery areas for a range of fish species including several that are recreationally important such as black bream.</p>
Waterbirds – diversity and abundance	<p>Ninety-five species of waterbird have been recorded within the site, including 24 listed under international migratory bird agreements.</p> <p>Complete counts are not available and waterbird abundance is a knowledge gap for the site.</p> <p>Nine species have been recorded breeding in the site, including several beach nesting species such as red-capped plover and little terns.</p>
Stratification	<p>The Glenelg Estuary is a seasonally closed salt-wedge estuary with three distinct layers which vary under different tidal and freshwater inflow conditions.</p> <p>Salinity follows a spatial gradient from the lower to the upper estuary. The salt wedge most of the time extends up the entire length of the estuary, with bottom water salinity often close to seawater and only occasional differences between the lower and upper estuaries.</p>
Diversity of wetland types	<p>The site comprises a network of interconnected wetland types including freshwater permanent wetlands, intermittently inundated marshes, estuarine waters and intertidal sandy beaches.</p>
Special geomorphic features	<p>The site is significant for a number of geological and geomorphic features; in particular the dune slack system is rare, if not unique within the bioregion.</p>
Provides physical habitat (for waterbirds)	<p>The site provides a network of habitats for waterbird feeding, roosting and breeding. Species that are supported by the site represent a wide range of functional groups (e.g. fishers, waders, ducks) each with different habitat requirements.</p>
Threatened wetland species and ecosystems	<p>One nationally listed ecological community and eight nationally or internationally listed species of conservation significance are supported by the site.</p>
Ecological connectivity	<p>The Ramsar site has a range of distinct wetland types which are both hydrologically and ecologically connected. The connection between the marine, estuarine and freshwater components is significant for fish migration and reproduction.</p>
Social and cultural values	<p>The Glenelg Estuary and Discovery Bay wetlands provide several cultural and socio-economic values. The site is significant for the Gunditjmarra people who have a continued connection to the <i>the Bocara Estuary and Koonang Gunditj</i>.</p> <p>The site is also important in terms of recreational and tourist values. Visitor numbers to the area, including the Lower Glenelg National Park and Discovery Bay Coastal Park can exceed 100,000 annually.</p>

2.4 Maintaining ecological character 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.

The LAC for Glenelg Estuary and Discovery Bay Ramsar Site were established in the ECD for critical components, processes and services (Butcher et al. 2017) and are summarised in Table 3.

Table 3: LAC for the Glenelg Estuary and Discovery Bay Ramsar Site Ramsar site.

Critical CPS	Limit of Acceptable Change
Hydrology	Bridgewater Lakes, Lake Moniboeng, Swan Lake, Malseed Lake and Cain Flat Swamp will not dry. The Glenelg Estuary will not remain closed for three consecutive years or open for greater than five years.
Stratification	See LAC for hydrology (Glenelg Estuary)
Vegetation type and extent	Vegetation extent will not fall below the following: Coastal saltmarsh - 13 hectares Freshwater sedges and tall marsh - 470 hectares, with at least 270 hectares of <i>Baumea</i> sedgeland.
Fish diversity and abundance	Native fish within the Ramsar site will represent each of the following life history strategies: estuarine dependent, estuarine opportunists, marine migrants, diadromous and obligate freshwater species.
Waterbird diversity and abundance	Absence of the following waterbird guilds in any three out of five years: <ul style="list-style-type: none"> • Ducks, swans and grebes • Fishers • Large wading birds • Australian waders • International waders • Gulls and terns Sanderling abundance falls below 0.7% of the global population in three out of five years.
Diversity of wetland types	See LAC for vegetation type and extent and hydrology.
Special geomorphic features: dune slack	No LAC
Physical habitat for waterbirds	See LAC for vegetation type and extent and hydrology.
Threatened species: plants	Absence of maroon leek-orchid (<i>Prasophyllum frenchii</i>) and or swamp greenhood (<i>Pterostylis tenuissima</i>) in three consecutive targeted surveys.
Threatened species: fish	Absence of Yarra pygmy perch (<i>Nannoperca obscura</i>) in any three out of five targeted surveys.
Threatened species: birds	Absence of hooded plover (<i>Thinornis rubricollis</i>) in three out of five years.
Threatened species: growling grass frog	Absence of growling grass frog (<i>Litoria raniformis</i>) in any three out of five targeted surveys.
Threatened species: ancient greenling	See LAC for vegetation type and extent (<i>Baumea</i> sedgeland).
Ecological connectivity	See LAC for hydrology (Glenelg Estuary) and fish (continued presence of diadromous fish).

3 Management priorities

Priority threats and values for management were identified through a process that included a risk assessment. The purpose of the risk assessment was to identify priority values and threats as the basis for identifying strategic actions for the Glenelg Estuary and Discovery Bay Ramsar Site. The risk assessment was underpinned by local knowledge and expert opinion and was used to identify priority values and threats. This process is illustrated in Figure 4. High priority values for each management unit are presented in Table 4 and high priority threats in Table 9.

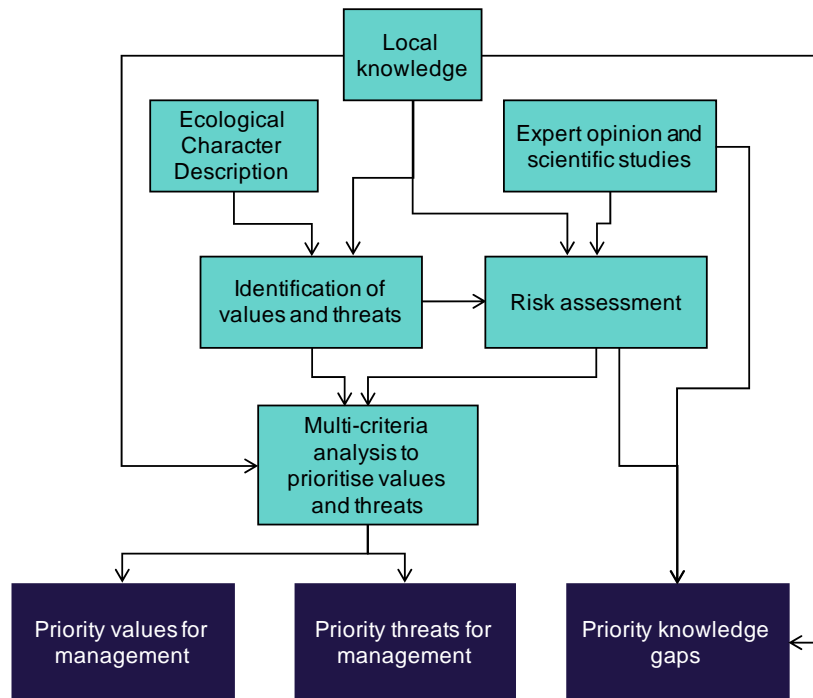


Figure 4: Process of prioritising values and threats and the role of the risk assessment.



Aerial image of Bridgewater looking west October 2015 (© Marcel Hoog Antink).

Table 4: Priority values for each management unit of the Glenelg Estuary and Discovery Bay Ramsar Site. High priority values for management are shaded.

Value	Management units		
	Freshwater wetlands	Estuary	Beach and dune fields
Hydrology: surface water regime	X	X	X
Hydrology: groundwater regime	X	X	
Vegetation: dune scrub			X
Vegetation: coastal saltmarsh		X	
Vegetation: freshwater sedge/tall marsh	X		
Fish diversity and abundance	X	X	X
Waterbird breeding	X	X	X
Hydrological process that support wetland type and extent	X	X	X
Threatened species: maroon Leek-orchid and Swamp greenhood	X		
Threatened species: fairy tern		X	X
Threatened species: hooded plover			X
Threatened species: Yarra pygmy perch	X		
Threatened species: growling grass frog	X		
Threatened species: ancient greenling	X		
Supports priority wetland species: migratory waterbirds			X

Table 5: Priority threats for each management unit of the Glenelg Estuary and Discovery Bay Ramsar Site. High priority values for management are shaded.

Threat	Management units		
	Freshwater wetlands	Estuary	Beach and dune fields
Invasive species: non-native non-woody weeds (e.g. phalaris, Sicilian sea lavender)	X	X	X
Invasive species: native woody weeds (e.g. coastal wattle)	X	X	X
Invasive species: non-native woody weeds (e.g. boxthorn)		X	X
Invasive species: non-native terrestrial animals (e.g. pigs, foxes)	X	X	X
Invasive species: non-native aquatic animals (e.g. carp)		X	
Energy production and mining: oil and gas drilling: decreased groundwater levels ¹	X		
Natural systems modification (e.g. inappropriate estuary openings): altered water regimes		X	
Natural systems modifications (wildfire): increased nutrients and sediments		X	
Climate change (sea level rise): increased ingress of marine water	X	X	X
Climate change (extreme storm events): increased beach erosion			X
Climate change (drought): altered water regimes	X	X	

¹ Assessed as a high priority threat by the community. However, with current controls in place the risk assessment, based on likelihood and consequence, rated this threat as negligible to low. Controls include that there is a permanent ban on fracking and a moratorium on conventional onshore gas exploration in Victoria until 2020. If this were to change in the future (e.g. if the moratorium was lifted), any proposed oil or gas drilling would be subject to State and Commonwealth environmental impact assessment processes. An EPBC Act referral would be required for any new activities that have the potential to impact the ecological character of a Ramsar site.

A number of knowledge gaps were identified when compiling the ECD and when considering threats to the ecological character of the Ramsar site. These are listed in Table 6.

Table 6: Summary of knowledge gaps and recommended actions.

Component / process	Knowledge Gap
Hydrology	Understanding of the hydrology of the whole Ramsar site.
	The relative influence of the Kanawinka Fault on the local hydrology.
Soils	Fine scale spatial patterning of soils across the site.
Fish	Baseline survey data for Malseed and Swan Lakes.
	Investigation on fish breeding and nursery habitats across freshwater lakes and estuary.
Waterbirds	Baseline records for breeding.
	Relative importance and use of interconnected habitat for waterbirds.
Vegetation	Baseline survey data for emergent and submergent vegetation at freshwater wetlands
	Extent of weed infestations in each management unit
Invertebrates	Macroinvertebrate community composition across all habitat types
	Conditions and habitat required for oviposition by ancient greenling.
	The relative importance of fish predation and hydrology in Long Swamp on ancient greenling.
	Understanding of the microinvertebrate community
Amphibians	Base line data on abundance and distribution
Phytoplankton	Extent and composition of algae and phytoplankton

4 Management actions and targets

Resource condition targets (RCTs) were developed for priority values to guide the development of management strategies. RCTs are statements of aspirational condition for each of the identified priority values (Table 7). Management strategies were developed by experts and stakeholders to meet the targets and address critical knowledge gap (Table 8). For further information see Section 4 of the full management plan.

Table 7: Resource condition targets

Critical CPS	Resource Condition Target
Hydrology	Maintain diversity of wetland types
Stratification	Maintain seasonal stratification in the Glenelg Estuary.
Vegetation type and extent	Maintain 2008 extent of freshwater vegetation communities.
Fish diversity and abundance	Maintain fish diversity and abundance, and 19 common species in all targeted surveys
Waterbird diversity and abundance	Maintain waterbird diversity (i.e. > 32 species regularly recorded). Maintain > 1% of the population of sanderling.
Diversity of wetland types	Maintain extent and diversity of wetland types.
Physical habitat for waterbirds	See RCT for Diversity of wetland types and Vegetation type and extent.
Threatened species: plants	Maintain abundance of maroon leek-orchid (<i>Prasophyllum frenchii</i>) and swamp greenhood (<i>Pterostylis tenuissima</i>)
Threatened species: fish	Increase abundance by 10% of Yarra pygmy perch (<i>Nannoperca obscura</i>) at Long Swamp.
Threatened species: birds	Maintain presence and abundance of threatened bird species at the site: Australasian bittern, hooded plover, fairy tern.
Threatened species: growling grass frog	Annual occurrence of growling grass frog within the site.
Threatened species: ancient greenling	Maintain population of ancient greenling.
Ecological connectivity	Maintain ecological connectivity between habitats in the site.

Table 8: Management strategies (Note that not list all partners that will be involved in the delivery of this activity are listed. Other partners will include landholders, traditional owners, not-for profits, NGOs and others).

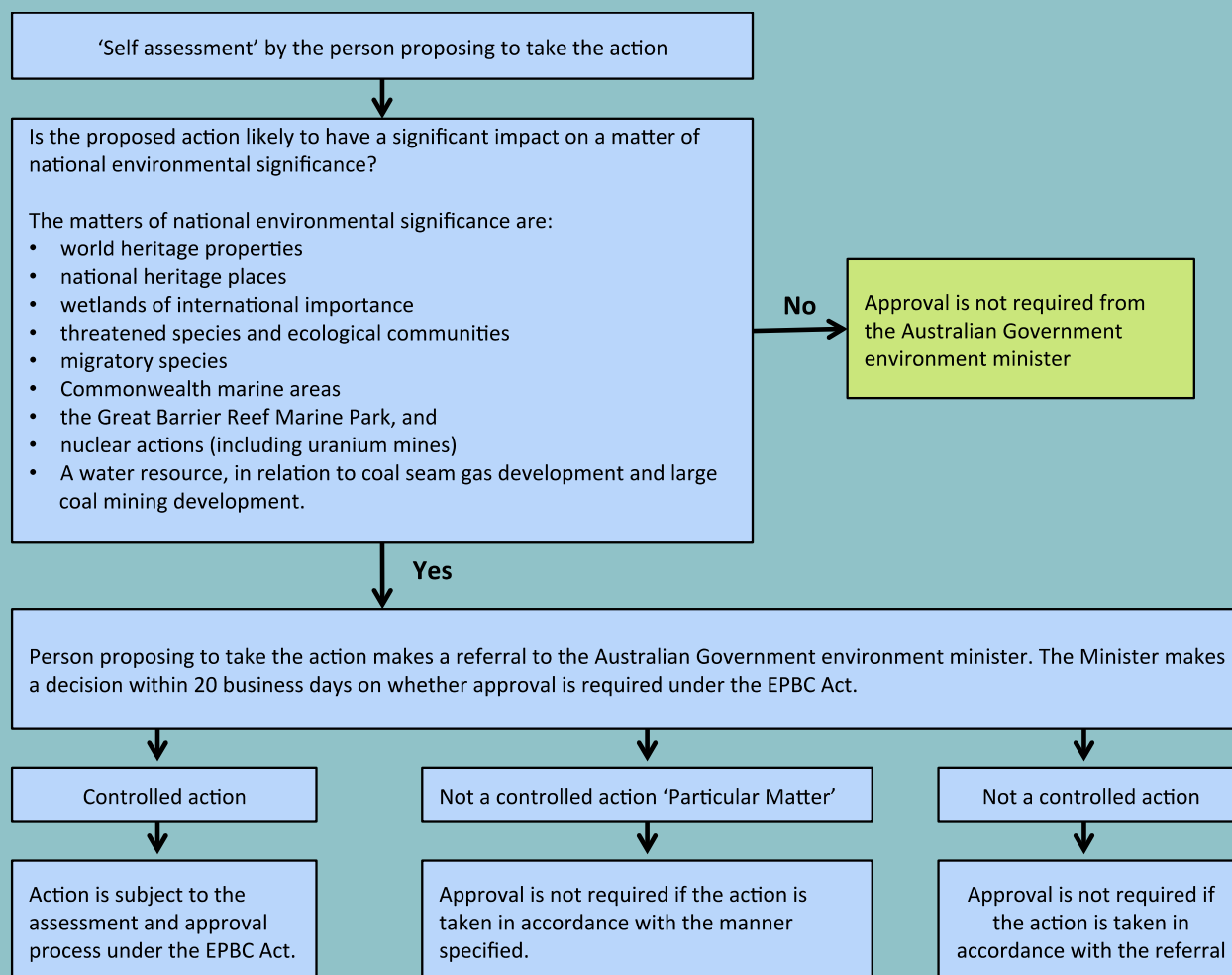
Management Strategies	Responsibility	Linkages to existing programs / activities	Man. Units
Continue to implement the actions in the Glenelg-Hopkins Waterway Strategy aimed at managing pest plants and animals within the Glenelg Estuary (Management activities 38-201.8 and 38-201.9) and Freshwater wetlands (Management activities 20501.5, 20502.3, 20614.4, 20614.5, 20562.1 and 20562.2).	Parks Victoria CMA DELWP	Glenelg-Hopkins Waterways Strategy Glenelg Ark	Estuary Freshwater wetlands
Continue to implement the actions in the <i>Ngootyoong Gunditj Ngootyoong Mara South West Management Plan</i> aimed at managing pest plants and animals within the Glenelg Estuary, Freshwater wetlands and Beach and dune fields.	Parks Victoria CMA DELWP	Ngootyoong Gunditj Ngootyoong Mara South West Management Plan Glenelg Ark Threatened species recovery plans	All
Continue to implement estuary opening protocols at the Glenelg Estuary in accordance with the Estuary Entrance Management Support System.	CMA	Glenelg Estuary Management Plan Glenelg-Hopkins Waterways Strategy	Estuary
Continue to develop and implement environmental watering in the Glenelg River and consider needs of Freshwater wetlands in Seasonal Watering Proposals.	CMA VEWH	Glenelg Seasonal Watering Proposals	Freshwater wetlands
Consider impacts to the ecological character of the site when implementing the Regional Groundwater Plan and Border Groundwater Agreement.	Southern Rural Water CMA	Border Groundwaters Agreement – South Australia-Victoria Glenelg Water Supply Protection Area Local Management Plan South West Limestone Aquifer Local Management Plan	Estuary Freshwater wetlands
Manage visitor activities in the Lower Glenelg National Park and the Discovery Bay Coastal Park to minimise disturbance of shorebirds and beach nesting birds.	Parks Victoria	Ngootyoong Gunditj Ngootyoong Mara South West Management Plan	Estuary Beach and dune fields
Investigate options to mitigate the impacts of climate change (sea level rise) on coastal habitats and improve resilience.	DELWP CMA		Estuary Beach and dune fields
Protect high priority locations from extensive shoreline erosion	Parks Victoria		Beach and dune fields
Develop and implement measures to control carp within the Glenelg Estuary and	CMA		Estuary

Management Strategies	Responsibility	Linkages to existing programs / activities	Man. Units
prevent movement into the Long Swamp Complex.	Parks Victoria		Freshwater wetlands
Continue to implement recovery plans for the threatened plant species at the site: maroon leek-orchid (<i>Prasophyllum frenchii</i>) and swamp greenhood (<i>Pterostylis tenuissima</i>)	DELWP Parks Victoria	Maroon Leek Orchid Recovery Plan Recovery Plan for Three Orchid Species in South Australia and Victoria	Freshwater wetlands
Continue to implement the recovery plan for the Yarra pygmy perch (<i>Nannoperca obscura</i>).	DELWP Parks Victoria	Yarra Pygmy Perch Recovery Plan	Freshwater wetlands
Implement the management strategies in the <i>Ngootyoong Gunditj Ngootyoong Mara South West Management Plan</i> aimed at reducing the impacts of bushfires and fire management on wetland and coastal habitats.	Parks Victoria DELWP	Ngootyoong Gunditj Ngootyoong Mara South West Management Plan	All
Continue to monitor the effects of the Long Swamp Restoration Trial and adaptively manage the program of works to maintain or improve ecological character.	CMA DELWP NGOs		Freshwater Wetlands
Develop and implement a Glenelg Estuary and Discovery Bay Ramsar Site wetland information and interpretation program.	Parks Victoria DELWP CMA Councils		All
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	CMA DELWP Parks Victoria	Ngootyoong Gunditj Ngootyoong Mara South West Management Plan	All
Build capacity and collaboration with community and industry groups by supporting citizen science and on-ground community action in Ramsar site management	CMA DELWP Parks Victoria NGOs		All
Convene a Ramsar Coordinating Committee for the Ramsar site	CMA DELWP PV		All

Management Strategies	Responsibility	Linkages to existing programs / activities	Man. Units
	Councils Traditional Owners Community representative		
Ramsar Coordinating Committee to develop and implement annual action plan.	CMA DELWP PV Councils Traditional Owners Community representative		All
Apply the appropriate State and Commonwealth environmental impact assessment processes for activities that have the potential to impact on the Ramsar site and Matters of National Environmental Significance (MNES).	DELWP DoEE		All
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		All

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 (the Minister). 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/environmental-assessments/assessment-and-approval-process>

5 Monitoring, evaluation, reporting and improvement

5.1 Framework

Consistent with the Victorian Waterway Management Strategy (VWMS) (DEPI 2013), the Ramsar Convention and the Australian Ramsar Management Principles, this Glenelg RSMP has adopted an adaptive management framework (Figure 5). The Glenelg RSMP will be renewed every eight years and will be underpinned by a monitoring program that reports on the condition of the system with respect to change in ecological character and progress towards meeting resource condition targets.

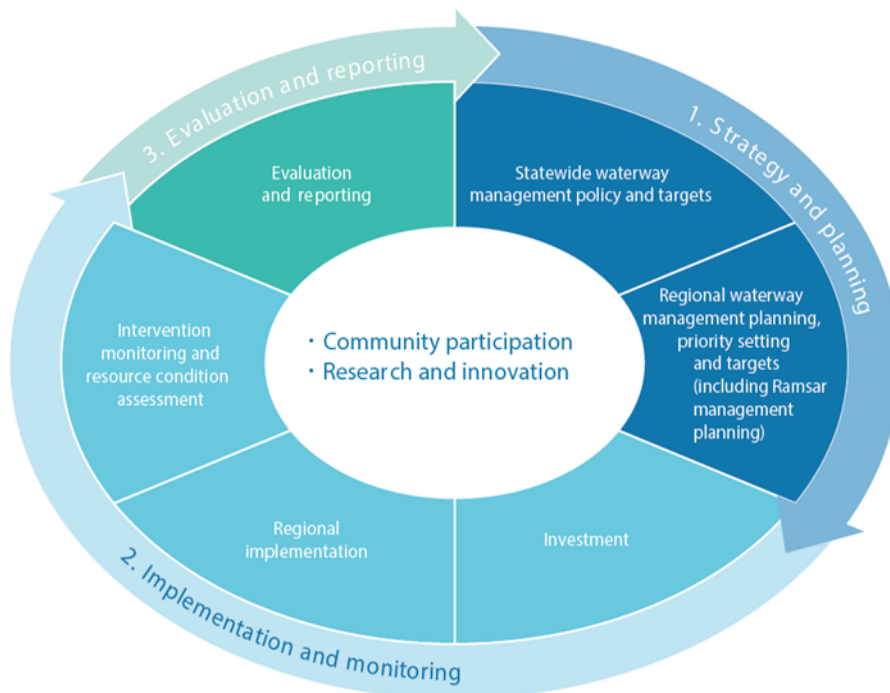


Figure 5: The eight-year adaptive management cycle of the Victorian Waterway Management Program, noting that this Ramsar management plan is a part of the regional waterway management planning process (adapted from DEPI 2013).

5.2 Condition monitoring

Monitoring recommendations to assess progress towards resource condition targets and change in ecological character (evaluated against limits of acceptable change) are provided in Table 9. Full monitoring programs, together with monitoring to assess the implementation of the plan will be included in annual implementation planning (see Section 6). It should be noted that many of the existing monitoring programs have limited funding and timelines and an assessment of ongoing monitoring against monitoring needs will be required as part of implementation planning.

In addition to the core monitoring requirements complementary monitoring activities should be considered by the Ramsar Coordinating Committee. Examples of complementary monitoring activities would include:

- Species and communities that are not listed as high priority values for management
- Emergent pest plant and animal threats
- Community monitoring
- Citizen science projects and activities, and
- Extending existing project based monitoring activities.

Table 9: Summary of monitoring needs.

Program	Indicators and method	Locations
Hydrology	Surface and groundwater levels at key locations in the Freshwater Wetlands Management Unit	Freshwater Wetlands
Hydrology	Estuary opening / closing	Estuary
Vegetation: freshwater (emergent and submerged)	Extent mapping and condition consistent	Freshwater Wetlands
Threatened plant species: Maroon leek-orchid, swamp greenhood	Annual surveys (as per recovery plans)	Freshwater Wetlands
Vegetation: saltmarsh	Extent of saltmarsh and mangroves (as per (Boon et al. 2011). Condition against EVC benchmarks	Estuary
Fish diversity and abundance (including threatened Yarra pygmy perch)	Electro-fishing and netting as per current Nature Glenelg Trust Program	Freshwater Wetlands Estuary
Waterbird abundance	Bi-annual counts; BirdLife Australia standard methods.	Key locations in freshwater wetlands, Glenelg Estuary and Discovery Bay beach
Waterbird breeding	Annual surveys nest counts, breeding success (i.e. fledgling)	Key locations in freshwater wetlands, Glenelg Estuary and Discovery Bay beach
Threatened bird species: Australasian bittern	BirdLife Australia standard methods	Freshwater wetlands
Threatened species: Growling grass frog	Calls, tadpoles	Freshwater Wetlands
Threatened species: ancient greenling	Mark recapture study according to methods of Cordeo-Riveria (2015)	Freshwater Wetlands

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 measurable 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 in prep.). 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 Glenelg RSMP, and will coordinate monitoring and evaluation of the plan (see Section 6.2) as per the site MERI plan (see 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

Roles and responsibilities for managing Ramsar sites are set out in *Wetlands in Australia – Roles and Responsibilities* (<http://www.environment.gov.au/water/wetlands/publications/factsheet-wetlands-australia-roles-and-responsibilities>). Management of Ramsar sites in Victoria is coordinated by the Victorian Government, through the Department of Environment, Land, Water and Planning (DELWP) (see section 1.3 for relevant international, national and Victorian state policy and legislation).

6.2 Implementation

The Glenelg Hopkins CMA will co-ordinate implementation of the Glenelg RSMP, on behalf of regional agency partners. A Ramsar Coordinating Committee (RCC) comprising representatives of the partner organisations primarily responsible for the management of the Ramsar site (Glenelg Hopkins CMA, DELWP, Parks Victoria, Gunditj Mirring Traditional Owners Aboriginal Corporation and DoEE) will be convened and co-ordinated by the Glenelg Hopkins CMA. The Ramsar Coordinating Committee will also include local stakeholder representation.

6.2.1 Implementation planning

Each of the agency delivery partners will prepare agency implementation plans for the actions for which they are identified as responsible in the Glenelg RSMP. Each agency will work within their established legislative, regulatory and administrative arrangements.

The Glenelg Hopkins CMA will integrate these agency plans into a single implementation plan for the Glenelg RSMP to ensure that the responsibilities for individual management actions are clearly established, priorities and sequencing is logical, implementation is targeted and coordinated, and funding opportunities are identified.

The plan will also establish monitoring, evaluation and reporting and improvement (MERI) requirements. The implementation plan will ultimately cover the eight-year period of this RSMP, and be regularly reviewed (in line with agency review cycles) to maintain its currency and relevance. The site MERI plan will document knowledge gaps and set out a monitoring and data collection program to fill these gaps and inform adaptive management. The MERI plan and annual action planning process will ensure that new knowledge gaps are identified as they emerge and are targeted by the site monitoring program.

6.2.2 Ramsar Coordinating Committee

The RCC will be convened and co-ordinated by Glenelg Hopkins CMA. This integration 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 Glenelg RSMP Ngootyoong Gunditj Ngootyoong Mara South West Management Plan (Parks Victoria 2015). The RCC will be responsible for coordinating specific aspects of implementation within the themes of the RSMP. These responsibilities will include developing:

- Implementation targets
- Action planning (including setting priorities for management), updated annually
- Targeted investment proposals
- Integrated delivery arrangements
- Coordinated monitoring and evaluation of implementation, including integrated reporting against targets
- Communication and engagement strategy, and
- Reviewing RSMP progress bi-annually.

6.2.3 Resourcing implementation

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

Implementation of the Glenelg RSMP will be influenced by available funding and resources. The implementation approach that will be applied will coordinate the 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 RSMP, the Glenelg Hopkins CMA will work with the RCC to use the best available information tools to support the establishment of annual priorities. The Glenelg Hopkins CMA will also work with the RCC to maintain the currency and accuracy of data and information to support implementation.

Implementation of the Glenelg RSMP will be influenced by available funding and resources. 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.

6.3 Communication

The Glenelg Hopkins CMA will co-ordinate communications and engagement for the Ramsar site as part of its role in co-ordinating implementation of the Glenelg RSMP. A communication plan and engagement strategy, developed by the RCC, will guide stakeholder interactions. In particular, the communication plan will aim to include the local community (farmers, fishers, tourists, townspeople) in understanding the international values and importance of the site and how to maintain its values.

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