

# Ecological Character Description Addendum

Western Port Ramsar Site



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### **Photo credit**

Saltmarsh on the western shore of Western Port near Bittern. Janet Holmes.

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# 1. Introduction

An ecological character description (ECD) was completed for the Western Port Ramsar Site in 2010 (Kellogg, Brown and Root 2010). Since that time, new information has been generated for the site, which has resulted in amendments to the ECD for the Western Port Ramsar Site documented in this addendum. These amendments are outlined below.

- There has been a reassessment of the wetland types that occur in the site. Western Port Ramsar Site does not support two wetland types in Kellogg, Brown and Root (2010): rocky marine shores (D) and estuarine waters (F). Areas have been provided for each of the four wetland types present at the site.
- There has been a review and updating of the Criteria for Identifying Wetlands of International Importance (Ramsar criteria) met by the site. This review found that Western Port meets the same criteria, but the justification for meeting each criterion has been better aligned with the requirements of the Ramsar guidance. In some cases, new information has been used to justify the individual criterion being met.
- A review of identified critical components, processes and services has been undertaken. This resulted in a change to the critical components: significant flora species and significant fauna species, to reflect recent changes to species listed as threatened under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) and to limit the list of species to those that are regularly supported by the site and are wetland dependent.
- A review and update of Limits of Acceptable Change has been undertaken.

## 2. Wetland types

Western Port supports four wetland types:

- B - Marine subtidal aquatic beds (underwater vegetation) (15,000 Ha);
- G - intertidal mud, sand or salt flats (27,000 Ha);
- H - intertidal marshes (1,144 Ha); and
- I - intertidal forested wetlands (1,700 Ha).

## 3. Ramsar criteria

At the time of listing, the Western Port Ramsar site would have met six of the current nine Ramsar criteria, and continues to do so.

### 3.1 Changes resulting from a review of the Ramsar criteria

The criteria met by the site as stated in Kellogg, Brown and Root (2010) have been reviewed. The following changes have been made.

#### Criterion 1

This criterion considers habitat types and their representativeness within a given biogeographic region (bioregion). As the basis for assessing criterion 1, Kellogg, Brown and Root (2010) used Interim Biogeographic Regionalisation for Australia, whereas the Integrated Marine and Coastal Regionalisation of Australia (IMCRA) is the appropriate framework for marine wetlands such as Western Port (DSEWPac 2012).



## Criterion 2

A reassessment has been made of the species and communities that contribute to the site meeting criterion 2. The list of species has been restricted to those listed as threatened under the EPBC Act and/or the IUCN Red List that are wetland dependent and regularly occur at the site, in accordance with Ramsar guidance.

Only four of the species identified by Kellogg, Brown and Root (2010) are wetland-dependent and only one (the Australian fairy tern) occurs regularly. While there are historic records of orange-bellied parrot (*Neophema chrysogaster*) from the saltmarshes of the site, the species is in serious decline and has not been recorded in the Western Port Ramsar Site for over two decades (BirdLife Australia unpublished data). There is a single record of an Australian painted snipe (*Rostratula australis*) from Pyramid Rock in 1979 and a possible 1982 record of growling grass frog (*Litoria raniformis*) for which the location is uncertain. These records are insufficient to indicate that the site regularly supports these species. However, using the most recent lists of nationally and internationally threatened species and communities, seven fauna species and one ecological community meet the criterion.

## Criterion 3

The ECD for this site (Kellogg, Brown and Root 2010) provided a justification for criterion 3 based on the abundance and diversity of migratory shorebirds and overall waterbird diversity. Guidance from the Convention indicates that this criterion should be applied to wetlands which are “hotspots” of biological diversity, centres of endemism and/or contain the range of biological diversity (including habitat types) occurring in a biogeographical region. While overall diversity of waterbirds is relevant to the criterion, an inventory of wetland dependent species is not available for the Bass Strait IMCRA Bioregion. However, there is evidence to indicate that the Western Port Ramsar site meets this criterion with respect to marine invertebrates.

## Criteria 6 and 8

A review of waterbird data and inclusion of recent data indicate that six rather than ten species meet criterion 6.

In relation to criterion 8, in addition to being a nursery area for fish species, the site also supports fish species that migrate between fresh, estuarine and marine waters.

## 3.2 Updated justification for Ramsar criteria met

### Criterion 1

*A wetland should be considered internationally important if it contains a representative, rare, or unique example of a natural or near-natural wetland type found within the appropriate biogeographic region.*

The appropriate bioregion for the site is the Bass Strait Shelf IMCRA<sup>1</sup> Province which extends from Apollo Bay to Waratah Bay in Victoria including Port Phillip Bay and Western Port, the entire north coast of Tasmania and the waters between (Department of the Environment, Water, Heritage and the Arts 2008). Although there is not a complete inventory of wetlands and coastal ecosystems across the bioregion, there is evidence to suggest that Western Port contains good representatives of three Ramsar wetland types<sup>2</sup>: B (Marine subtidal aquatic beds (underwater vegetation), G (intertidal mud, sand or salt flats); H (intertidal marshes) and I (intertidal forested wetlands).

Western Port contains a very large expanse of intertidal sand and mudflats and marine subtidal aquatic beds. The extensive areas of saltmarsh and mangroves within the Ramsar site (wetland types H and I) are considered to be in good condition (Boon et al. 2011).

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<sup>1</sup> Integrated Marine and Coastal Regionalisation of Australia

<sup>2</sup> Note that the fourth wetland type in the Western Port Ramsar site “B - Marine subtidal aquatic beds (underwater vegetation)” while critical to character, is not considered the best example of this wetland type in the bioregion.

This criterion was met at listing and continues to be met.

## Criterion 2

*A wetland should be considered internationally important if it supports vulnerable, endangered, or critically endangered species or threatened ecological communities.*

This criterion has been applied to wetland dependent flora, fauna and communities, and those listed as vulnerable, endangered or critically endangered under national legislation (EPBC Act) or internationally (IUCN Red List). The site regularly supports one wetland dependent threatened ecological community and seven threatened fauna species:

Coastal saltmarsh – Vulnerable ecological community

Australian fairy tern (*Sternula nereis nereis*) – Vulnerable

Bar-tailed godwit (*Limosa lapponica baueri*) - Vulnerable<sup>3</sup>

Curlew sandpiper (*Calidris ferruginea*) – Critically endangered

Eastern curlew (*Numenius madagascariensis*) – Critically endangered

Lesser sand plover (*Charadrius mongolus*) – Vulnerable

Red knot (*Calidris canutus*) - Endangered

Australian grayling (*Prototroctes maraena*) – Vulnerable

There are isolated records of the nationally vulnerable hooded plover (*Thinornis rubricollis rubricollis*) from beaches within the Ramsar site. However, habitat requirements and records for this species indicate that the open coast beaches on the southern shore of Phillip Island are important for hooded plover (Weston 2003, Maguire et al. 2014). These are outside the boundary of the Ramsar site.

This criterion was met at listing and continues to be met.

## Criterion 3

*A wetland should be considered internationally important if it supports populations of plant and/or animal species important for maintaining the biological diversity of a particular biogeographic region.*

The soft sediments of Western Port support a high diversity of ghost shrimps, including *Michelea microphylla*, a local endemic species known only from Crib Point (Wilson et al. 2011). The intertidal and subtidal reefs at San Remo, which support a high diversity of one invertebrate group — opisthobranchs (sea-slugs and sea-hares) and Crawfish Rock, although small, is considered especially diverse: 600 species have been documented at this site: 130 algae, 150 sponges, 50 hydroids, 180 bryozoans and 80 ascidians (Shapiro 1975). In addition, the rare hydroid *Ralpharia coccinea* found at Crawfish Rock, and may be endemic to Western Port (Edmunds et al. 2010).

This criterion was met at listing and continues to be met.

## Criterion 4

*A wetland should be considered internationally important if it supports plant and/or animal species at a critical stage in their lifecycles, or provides refuge during adverse conditions.*

The description of this criterion implies a number of common functions and roles that wetlands provide including supporting fauna during migration and breeding. Over 35 waterbird species listed under international migratory agreements have been recorded within the Ramsar site. This

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<sup>3</sup> 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).

number includes species that, in Australia, are residents (e.g. eastern great egret) and vagrant seabirds for which the site does not provide significant habitat (e.g. Artic jaeger). There are 12 species of international migratory shorebirds that are regularly supported (in two thirds of seasons) by the Western Port Ramsar Site (Table 1).

**Table 1: Palaearctic migratory waders recorded in Western Port and their frequency of occurrence (percentage). The 12 species that the site regularly supports are in bold and shaded.**

Common name	Species name	JAMBA	CAMBA	ROKAMBA	Frequency of occurrence
<b>Bar-tailed godwit</b>	<b><i>Limosa lapponica</i></b>	<b>X</b>	<b>X</b>	<b>X</b>	<b>100</b>
Black-tailed godwit	<i>Limosa limosa</i>	X	X	X	3
Broad-billed sandpiper	<i>Limicola falcinellus</i>	X	X	X	3
<b>Common greenshank</b>	<b><i>Tringa nebularia</i></b>	<b>X</b>	<b>X</b>	<b>X</b>	<b>100</b>
Common sandpiper	<i>Actitis hypoleucos</i>	X	X	X	18
<b>Curlew sandpiper</b>	<b><i>Calidris ferruginea</i></b>	<b>X</b>	<b>X</b>	<b>X</b>	<b>100</b>
<b>Eastern curlew</b>	<b><i>Numenius madagascariensis</i></b>	<b>X</b>	<b>X</b>	<b>X</b>	<b>100</b>
Great knot	<i>Calidris tenuirostris</i>	X	X	X	18
Greater sand plover	<i>Charadrius leschenaultii</i>	X	X	X	26
Grey plover	<i>Pluvialis squatarola</i>	X	X	X	12
<b>Grey-tailed tattler</b>	<b><i>Tringa brevipes</i></b>	<b>X</b>	<b>X</b>	<b>X</b>	<b>85</b>
Latham's snipe	<i>Gallinago hardwickii</i>	X	X	X	3
<b>Lesser sand plover</b>	<b><i>Charadrius mongolus</i></b>	<b>X</b>	<b>X</b>	<b>X</b>	<b>68</b>
Marsh sandpiper	<i>Tringa stagnatilis</i>	X	X	X	9
Oriental pratincole	<i>Glareola maldivarum</i>	X	X	X	-
<b>Pacific golden plover</b>	<b><i>Pluvialis fulva</i></b>	<b>X</b>	<b>X</b>	<b>X</b>	<b>94</b>
Pectoral sandpiper	<i>Calidris melanotos</i>	X	X	X	-
<b>Red knot</b>	<b><i>Calidris canutus</i></b>	<b>X</b>	<b>X</b>	<b>X</b>	<b>85</b>
<b>Red-necked stint</b>	<b><i>Calidris ruficollis</i></b>	<b>X</b>	<b>X</b>	<b>X</b>	<b>100</b>
Ringed plover	<i>Charadrius hiaticula</i>	X	X	X	-
Ruff	<i>Philomachus pugnax</i>	X	X	X	3
<b>Ruddy turnstone</b>	<b><i>Arenaria interpres</i></b>	<b>X</b>	<b>X</b>	<b>X</b>	<b>94</b>
Sanderling	<i>Calidris alba</i>	X	X	X	-
<b>Sharp-tailed sandpiper</b>	<b><i>Calidris acuminata</i></b>	<b>X</b>	<b>X</b>	<b>X</b>	<b>94</b>
Terek sandpiper	<i>Xenus cinereus</i>	X	X	X	59
Wandering tattler	<i>Tringa incana</i>	X	X	X	3
<b>Whimbrel</b>	<b><i>Numenius phaeopus</i></b>	<b>X</b>	<b>X</b>	<b>X</b>	<b>100</b>
Wood sandpiper	<i>Tringa glareola</i>	X	X	X	3

The site provides both feeding and high tide roost sites for these species (Hansen et al. 2011). In addition, over 20 species of wetland dependent bird species have been recorded breeding within the site. In particular, the site provides habitat for beach nesting birds such as the Australian fairy tern, Australian pied oystercatcher and red-capped plover on French Island and the north shore of Phillip Island (Dann 2011).

This criterion was met at listing and continues to be met.

### Criterion 5

*A wetland should be considered internationally important if it regularly supports 20,000 or more waterbirds.*

Data provided by BirdLife Australia and Richard Loyn (Western Port Bird Survey 1973 – 2015) indicate Western Port Ramsar site supports > 20,000 waterbirds in 80 percent of years (annual maximum count). This satisfies the Convention requirements of “at least two thirds of seasons” to meet this criterion. Although there was a decline in total waterbird abundance from the mid 2000s, the site continues to meet this criterion (Figure 1).

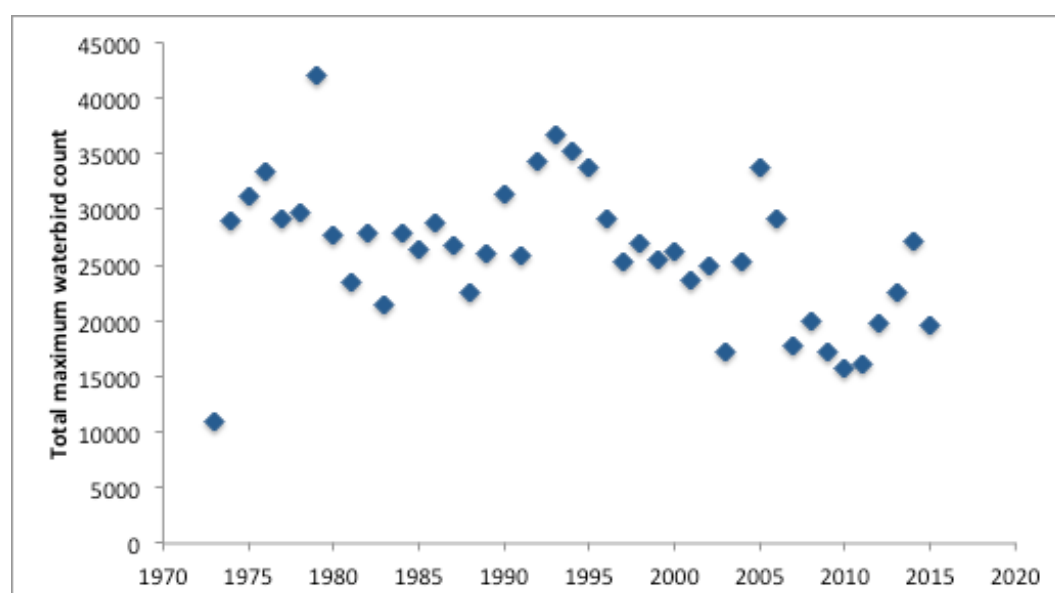


Figure 1: Total annual maximum waterbird count (data represents the sum of maximum counts for all waterbird species in a calendar year, calculated from count data provided by BirdLife Australia and Richard Loyn).

### Criterion 6

*A wetland should be considered internationally important if it regularly supports 1% of the individuals in a population of one species or subspecies of waterbird.*

Assessment of this criterion must be made using the most recent official population estimates (Wetlands International 2012). Data provided by BirdLife Australia and Richard Loyn (1973 – 2015) indicate that six species meet this criterion (Table 2).



**Table 2: Species for which Western Port regularly supports > 1% of the population, with mean maximum counts (1973 – 2015) from data provided by BirdLife Australia and Richard Loyn.**

Common name	Species name	Mean max. count	% of pop.
Australian fairy tern	<i>Sternula nereis</i>	45	3
Australian pied oystercatcher	<i>Haematopus longirostris</i>	301	3
Curlew sandpiper	<i>Calidris ferruginea</i>	3500	2
Eastern curlew	<i>Numenius madagascariensis</i>	1050	3
Pacific gull	<i>Larus pacificus</i>	320	6
Red-necked stint	<i>Calidris ruficollis</i>	6500	2

### Criterion 8

*A wetland should be considered internationally important if it is 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 seagrass and other habitats within the embayment act as important nursery habitat for a range of fish and crustacean species (MacDonald 1992, Jenkins et al. 2013). Western Port is a key breeding area for some species such as elephant fish (*Callorhinchus milii*), school shark (*Galeorhinus australis*) and Australian anchovy (*Engraulis australis*), and a nursery area for other species such as King George whiting (*Sillaginodes punctatus*), yellow-eye mullet (*Aldrichetta forsteri*) and Australian salmon (*Arripis spp.*) (Jenkins 2011).

The site also supports a number of fish species that migrate between fresh, estuarine and marine waters as part of their life cycles, including the Australian grayling, black bream (*Acanthopagrus butcheri*) and the short-finned eel (*Anguilla australis*).

This criterion was met at listing and continues to be met.

## 4. Critical components, processes and services

### 4.1 Changes to critical components, processes and services

The Western Port ECD identified eight components, two processes and two services that are critical to the ecological character of the Ramsar site (critical CPS). Of these, the flora-significant species component (ECD section 2.3.3) is no longer considered a critical CPS and the fauna-significant species component (ECD section 2.3.4) has been updated to reflect recent species listings and information from the site.

Descriptions of the other critical CPS are unchanged and can be found in that ECD (Kellogg Brown and Root 2010):

- Wetland bathymetry – ECD section 2.3.1
- Geomorphology and sedimentation – ECD section 2.3.2
- Flora-seagrass – ECD section 2.3.3
- Flora-mangrove and saltmarsh – ECD section 2.3.3
- Fauna-waterbirds – ECD section 2.3.4
- Fauna-marine invertebrates – ECD section 2.3.4
- Fauna-fish – ECD section 2.3.4

## Significant flora and fauna species

The ECD for the site (Kellogg Brown and Root 2010) lists 12 flora and 18 fauna species under the description of criterion 2 and in sections describing significant species. Many of the species are terrestrial in nature (e.g. Dense Leek-orchid, *Prasophyllum spicatum*; Southern Brown Bandicoot, *Isodon obesulus obesulus*) or reliant on freshwater habitat that is not present within the Ramsar site boundary (Growling Grass Frog, *Litoria raniformis*). There are also a number of pelagic seabirds such as albatross and petrel that use the site only opportunistically and species that have been recorded on only a single occasion (Australian painted snipe, *Rostratula australis*).

Although there are statements in the ECD indicating that most of the plant species are not nationally listed as threatened and that many of the fauna species are vagrants or use the site infrequently, it is not made clear that these are not evidence of meeting criterion 2, nor critical to the ecological character of the Ramsar site. None of the plant species listed are eligible under criterion 2 and therefore this component is not considered critical to the ecological character of the site.

Significant fauna species is listed as a critical component of the Western Port Ramsar site. To make ECDs for Victorian Ramsar sites more consistent, this is now described as the critical service “*supports threatened species*” and described below.

## 4.2 Critical service: supports threatened species

A reassessment of criterion 2 using the most recent lists of nationally and internationally threatened species has resulted in the identification of seven threatened fauna species for which the site provides critical and regular habitat and which are considered critical to the ecological character of the site (Section 3.2).

### Eastern curlew and curlew sandpiper

Eastern curlew (*Numenius madagascariensis*) and curlew sandpiper (*Calidris ferruginea*) are international migratory species that spend the non-breeding season in the southern hemisphere. They arrive in late spring, spend the summer feeding on invertebrates in intertidal mudflats and depart for the northern hemisphere in February to March. Juveniles of both species who arrive in the Ramsar site spend their first one or two winters at the site before heading to the northern hemisphere to breed. Although the two species have similar life histories, they are physically very different. The eastern curlew is the largest of the shorebirds with a wingspan of over one metre and a weight of nearly one kilogram. In contrast the curlew sandpiper is a small bird, with a weight of just 60 grams (Higgins and Davies 1996).

They are both listed as critically endangered under the EPBC Act due to declines in their global populations. Plots of Exponentially Weighted Moving Averages (EWMA) are designed to reflect long term changes in systems. EWMA for maximum annual counts (1981 to 2014) of the two species in Western Port indicate a strong and sustained decline in curlew sandpiper numbers from peaks in the 1990s. A similar, but less marked decline can also be observed for eastern curlew numbers at the site (Figure 1).

The reasons for the decline in these species lie beyond the boundaries of the Ramsar site. 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 recognized as the most significant impact factors (MacKinnon et al. 2012, Murray et al. 2015, Hua et al. 2015).

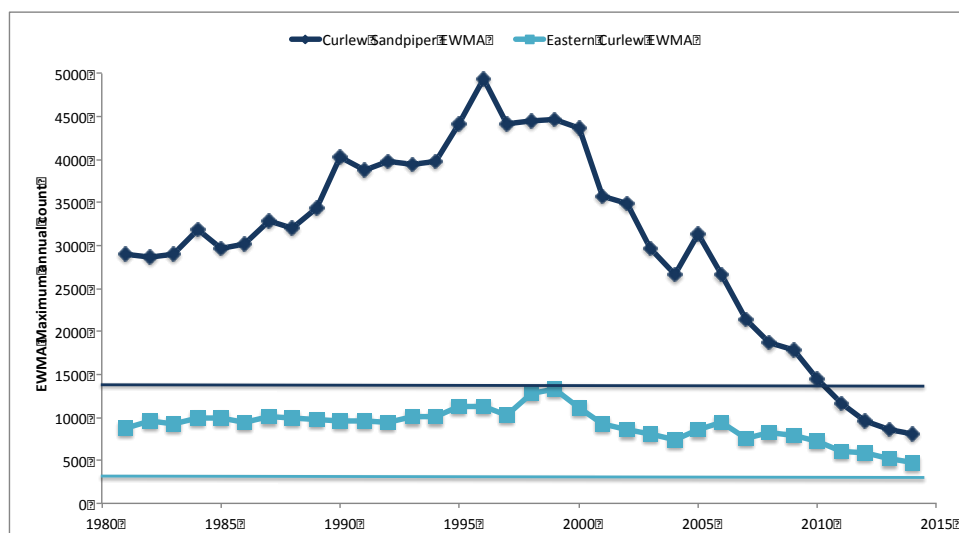


Figure 2: EWMA of curlew sandpiper and eastern curlew at Western Port from 1981 to 2014 (data from BirdLife Australia). Straight lines represent the 1% population thresholds for each species (1400 for curlew sandpiper and 320 for eastern curlew).

### Bar-tailed godwit, Lesser sand plover and red knot

Bar-tailed godwit (*Limosa lapponica baueri*), Lesser sand plover (*Charadrius mongolus*) and red knot (*Calidris canutus*) are also members of the East Asian-Australasian Flyway, breeding in the northern hemisphere and spending the non-breeding season feeding in Australia. Although they are frequent visitors to the Western Port Ramsar Site (recorded in 68 – 100 percent of years), they do not occur in sufficient numbers for trend analysis using site data. Like the curlew sandpiper and eastern curlew, they have declining flyway populations, which have been attributed to loss of habitat in staging areas such as the Yellow Sea (MacKinnon et al. 2012, Murray et al. 2015, Hua et al. 2015).

### Australian fairy tern

Australian fairy tern (*Sternula nereis nereis*) is an Australian resident, fish eating bird species. They feed close inshore on small schooling fish and, in the Ramsar site, anchovies and pilchards are likely to comprise the majority of their diet. There are two known breeding colonies in Western Port, the main one is at Rams Island, with three breeding records for the nearby Tortoise Island. On Rams Island the terns nest on sand or shell grit near the shoreline and since 2000 have also nested in dried seagrass (Lacey and O'Brien 2015).

The numbers of adults and breeding records from the Ramsar site are highly variable. Hansen et al. (2011) suggested a decline in the species within the Ramsar site, however, Lacey and O'Brien (2015) found no clear trend in numbers of adults or breeding records. The EWMA for Australian fairy tern numbers in the site reflects the highly variable numbers counted within the site, but appears to show a decline beginning in the late 1990s and a stabilisation and slight increase post 2005 (Figure 3).

### Australian grayling

Australian grayling (*Prototroctes maraena*) reside in the rivers of the catchment of Western Port (Koster and Dawson 2010). This diadromous species migrates to and from marine environments as part of its lifecycle (Crook et al. 2006, Schmidt et al. 2011). It is likely that larvae of the Australian grayling drift downstream into the Western Port Ramsar Site, with return upstream migration in spring of juveniles (Jenkins 2011). Maintaining connectivity between the marine environment and the rivers that drain into Western Port is essential for this threatened species.

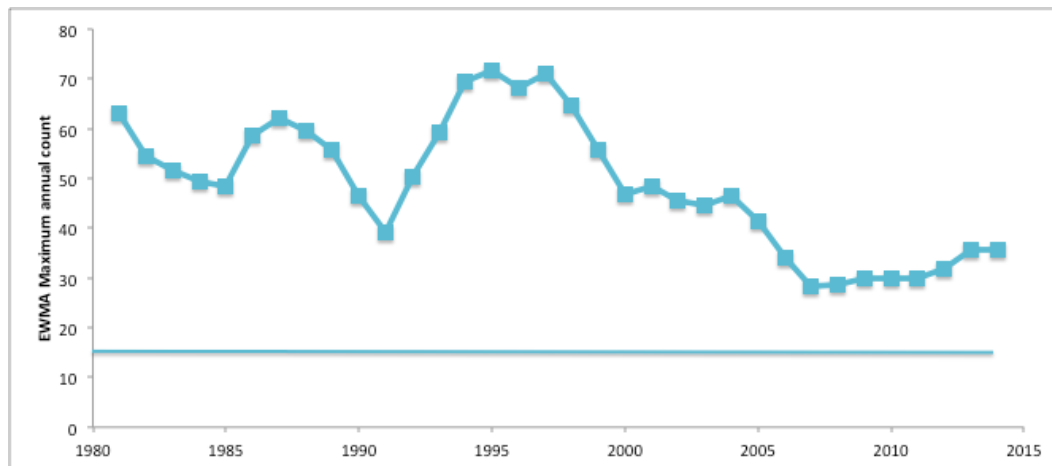


Figure 3: EWMA of Australian fairy tern at Western Port from 1981 to 2014 (data from Hansen et al. 2011 and Lacey and O'Brien 2015). Straight lines represent the 1% population threshold (15).

## 5. Limits of Acceptable Change

### 5.1 Summary of changes to the Limits of Acceptable Change

Limits of Acceptable Change (LAC) for the Western Port Ramsar Site were reviewed with site managers and relevant technical experts. LAC fell into one of four categories.

1. No change was made for
  - wetland bathymetry
  - geomorphology and sedimentation (no LAC set)
  - marine invertebrates (no LAC set) and
  - fish (no LAC set).

No additional information is available to set LAC for geomorphology and sedimentation, marine invertebrates and fish.

2. A change was made to the wording of the LAC to wording to make it more easily assessable, but numerical limit remains unchanged for
  - fauna-waterbirds.
3. New information resulted in a refinement or significant change to the LAC
  - flora – mangrove and
  - flora – saltmarsh.
4. A new LAC was set for critical CPS that formerly did not have a LAC defined
  - flora – seagrass and
  - supports threatened species.

### 5.2 Revised Limits of Acceptable Change

The revised LAC are set out in the Table 3. The complete set of LAC for the site are shown in Table 4.

**Table 3: Revised LAC for the Western Port Ramsar Site**

Critical CPS	Existing LAC	Evidence	Revised LAC	Confidence
Flora - Seagrass	No LAC proposed	<p>Seagrass extent was measured by Shapiro (1975) at 25,000 hectares but this area declined by approximately 30% to 7,200 hectares in 1983–84. It then increased in to 13,000 hectares in 1999–2000 (Blake and Ball 2001) and 15,000 hectares in 2011 (Holland et al. 2013).</p> <p>The LAC should be based on conditions at the time of listing (late 1982), which is the low figure of 7200 hectares. Noting that seagrass extent can be highly variable over time (Ball et al. 2014).</p> <p>LAC represents a 25% decline from conditions at the time of listing, with a timeframe that allows for cycles of loss and recovery.</p>	Total seagrass extent will not decline below 5400 hectares for a period of greater than 10 consecutive years.	Medium
Flora - Mangrove	10 % change from 13,700 ha	<p>The extent of mangrove in Kellogg Brown and Root (2010), on which the LAC was based is considered erroneous. A number of sources (Boon et al. 2011, Melbourne Water Corporation. 2011, Kirkman 2013) indicate that mangrove extent in 1975 was around 12 km<sup>2</sup> (1200 hectares) and is now 17.0 km<sup>2</sup> (1700 hectares). This is consistent with the work of Rogers et al. (2005) who demonstrated increases in mangrove (at the expense of saltmarsh) in Western Port.</p> <p>As assessment against this LAC is likely to be via remote sensing, the LAC must be set at a level that can be detected reliably. A 10 percent change is very small and unlikely to represent a change in character across the Ramsar site. A LAC of a 25% decline, from the time of listing, is considered to more adequately represent a potential change in character.</p>	Total mangrove extent will not decline below 900 hectares.	Medium



Critical CPS	Existing LAC	Evidence	Revised LAC	Confidence
Flora - Saltmarsh	15% change from 31,000 ha	<p>The extent of saltmarsh in Kellogg Brown and Root (2010), on which the LAC was based is considered erroneous, as 31,000 ha is greater than the entire mapped area of coastal saltmarsh in Victoria of 19,212 ha (Boon et al. 2011). The most recent mapping of saltmarsh, using the definitions of Boon (2011) indicate that there are 1143 hectares of saltmarsh inside the Ramsar site boundary (noting that there is a large area of saltmarsh adjacent to the site, but outside the site boundary). As natural variability of saltmarsh extent is low and the recovery of saltmarsh from disturbance is known to be slow (Saintilan 2009), the LAC is based on the 2011 extent.</p> <p>The LAC has been set to be consistent with that for other Victorian Ramsar sites supporting saltmarsh – a 25% decline from the time of listing. LAC for condition of saltmarsh is also desirable and Boon et al. (2011) suggested EVC benchmarks for the community. However, there is no benchmark of condition against which change could be assessed.</p>	Total saltmarsh extent will not decline below 850 hectares.	Medium
Waterbirds	A drop in mean or maximum values of $\geq 20$ per cent over a five-year period for the guilds identified in the ECD.	<p>The wording of this LAC, makes it difficult to assess against without considerable effort in determining the numbers of waterbirds and the groups in questions. The LAC has been re-written to make future assessments easier.</p> <p>The site is important (particularly around French Island) for nesting fairy tern and oystercatchers. There is no long term quantitative data available for most beach nesting birds. Data on fairy tern nests indicate highly variable numbers, and gaps of up to five years when terns do not nest (Lacey and O'Brien 2015). Insufficient data to set a quantitative LAC.</p>	<p>Abundance of waterbirds will not decline below the following (calculated as a rolling five year average of maximum annual count):</p> <p>Total waterbirds – 12 000  Migratory waders – 5300  Australasian waders - 800  Ducks - 500  Fishers - 550  Gulls - 1600  Large wading birds - 980  Swans – 1600</p> <p>Breeding of beach nesting birds annually within the site</p>	<p>Medium</p> <p>Low</p>

Critical CPS	Existing LAC	Evidence	Revised LAC	Confidence
Supports threatened species – birds	No LAC proposed	<p>There has been a decline in shorebirds species numbers that has been attributed to factors outside the Ramsar site boundary, in international staging areas (Hansen et al. 2011). To reflect changes at a site rather than a population scale, a LAC based on comparison with the latest population data from Wetlands International is proposed for the three threatened species that occur in abundances greater than 1% of the population. A LAC based on presence is proposed for the remaining three species.</p> <p>The quantitative LAC has been calculated based on the maximum counts from 1975 to 1994, a 20-year period that should reflect conditions at the time of listing. At this time the three species supported the following numbers (% of population):</p> <p>Australian fairy tern – 45 (3%)  Curlew sandpiper – 2900 (2.5%)  Eastern curlew – 1050 (3%)</p> <p>The remaining three species (bar-trailed godwit, lesser sand plover and red knot) occurred in 85 – 100 % of years. The LAC is based on meeting the conditions of “regularly supports” of at least three years in five.</p>	<p>Abundance of eastern curlew, curlew sandpiper and fairy tern will not decline below 1% of the population as stated in the most recent Wetlands International Population estimate (based on a five-year rolling average of annual maximum counts).</p> <p>Presence of bar-tailed godwit, lesser sand plover and red knot in at least three out of every five years.</p>	Medium
Supports threatened species - fish	No LAC proposed	The Australian grayling passes through the Ramsar site as part of its lifecycle, but is unlikely to be easily detectable within the Ramsar site during these brief periods of migration.	Australian grayling continues to be supported in one or more of the catchments draining into Western Port.	Low

## 6. Threats to ecological character

No additional threats beyond those identified in the ECD (Kellogg Brown and Root 2010) have been identified. The Ramsar site management plan contains a comprehensive risk assessment and identification of priority threats for management (DELWP 2017). Details on threats to the site can be found in the ECD (section 4) and the management plan (section 3).

## 7. Changes since listing

The results of a 2016 assessment of the status of the critical CPS against LAC is set out in Table 4.

A majority of LAC are met, with the exception of waterbirds: curlew sandpiper. The curlew sandpiper population is known to be in decline, with speculation that this is a result of habitat loss in staging areas outside the Ramsar site (MacKinnon et al. 2012, Murray et al. 2015, Hua et al. 2015). This exceedance of a LAC is not related to conditions in the Western Port Ramsar Site and is not considered to be a potential change in character. It is anticipated that the global population estimate for this species will be considerably lower in the next revision of the Waterbird Population Estimates.

**Table 4: Summary of assessment against LAC for the Western Port Ramsar Site.**

Critical CPS	Limit of Acceptable Change	2016 Assessment
Wetland bathymetry	No loss of intertidal mudflat area (270 km <sup>2</sup> )	Although there has been work on coastal erosion, there is no current information on the extent of intertidal mudflat area. <b>Insufficient data to assess LAC.</b>
Geomorphology and sedimentation	No LAC set	<b>Not assessed</b>
Marine invertebrates	No LAC set	<b>Not assessed</b>
Flora - Seagrass	Total seagrass extent will not decline below 5400 hectares for a period of greater than 10 continuous years.	Melbourne water measured 15 000 hectares in 2011 (Holland et al. 2013). <b>LAC is met.</b>
Flora - Mangrove	Total mangrove extent will not decline below 900 hectares.	The most recent assessment of mangrove extent in Western Port indicates 1700 hectares. This represents an increase of 40% since the time of listing. <b>LAC is met.</b>
Flora - Saltmarsh	Total saltmarsh extent will not decline below 850 hectares.	The most recent assessment of saltmarsh extent in Western Port (Boon et al. 2011) indicates 1143 hectares. There is no evidence of a significant decline in saltmarsh extent. <b>LAC is met.</b>

Critical CPS	Limit of Acceptable Change	2016 Assessment
Waterbirds	<p>Abundance of waterbirds will not decline below the following (calculated as a rolling five-year average of maximum annual count):</p> <p>Total waterbirds – 12 000  Migratory waders – 5300  Australasian waders - 800  Ducks - 500  Fishers - 550  Gulls - 1600  Large wading birds - 980  Swans – 1600</p> <p>Breeding of beach nesting birds annually within the site</p>	<p>Average maximum count of each group of waterbirds from 2011 – 2015 was as follows (data from BirdLife Australia and Richard Loyn):</p> <p>Total waterbirds – 20,100  Migratory waders - 8500  Australian waders - 2500  Fishers - 810.  Ducks - 2100  Gulls - 2300  Large wading birds - 1200  Swans -2600</p> <p>Breeding of beach nesting birds has been recorded annually (Driessen and Maguire 2014)</p> <p><b>LAC is met.</b></p>
Supports threatened species – birds	<p>Abundance of eastern curlew, curlew sandpiper and fairy tern will not decline below 1% of the population as stated in the most recent Wetlands International Population estimate (based on a five-year rolling average of annual maximum counts).</p> <p>Presence of bar-tailed godwit, lesser sand plover and red knot in at least three out of every five years.</p>	<p>Data from 2011 – 2015 indicate that the average abundance of the three species were as follows:</p> <p>Eastern curlew – 438 (1% of population)  Curlew sandpiper – 622 (0.5% of population)  Fairy tern – 22 (1.5% of population)</p> <p>Data from 2011 – 2015 indicate presence of the three species:</p> <p>Bar-tailed godwit – all five years  Lesser sand plover – three years  Red knot - three years</p> <p><b>LAC is exceeded for curlew sandpiper, but met for all other species.</b></p>
Supports threatened species - fish	<p>Australian grayling continues to be supported in one or more of the catchments draining into Western Port.</p>	<p>Data from the Bunyip River (2008 – 2010) indicates that the Australian grayling are present, spawning and migrating through this system (Koster and Dawson 2010).</p> <p><b>LAC is met.</b></p>

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