



Ramsar Information Sheet

Published on 25 March 2025

Update version, previously published on : 1 January 2000

Australia

Lake Gore



Designation date	5 January 2001
Site number	1049
Coordinates	33°48'05"S 121°28'58"E
Area	4 017,00 ha

Color codes

Fields back-shaded in light blue relate to data and information required only for RIS updates.

Note that some fields concerning aspects of Part 3, the Ecological Character Description of the RIS (tinted in purple), are not expected to be completed as part of a standard RIS, but are included for completeness so as to provide the requested consistency between the RIS and the format of a 'full' Ecological Character Description, as adopted in Resolution X.15 (2008). If a Contracting Party does have information available that is relevant to these fields (for example from a national format Ecological Character Description) it may, if it wishes to, include information in these additional fields.

1 - Summary

Summary

The Lake Gore Ramsar site, located on the south coast of Western Australia, is an inland wetland system including a large lake (Lake Gore) and a downstream system of interconnected lakes, flats, marshes and pools of varying extents that are fed by Lake Gore.

The Ramsar site provides significant waterbird habitat, including for moulting and drought refuge. Waterbird species listed under international migratory bird agreements, have been observed regularly at the site.

The site supports high numbers of Australian shelduck (*Tadorna tadornoides*), which use Lake Gore during their moulting period. The numbers of shelduck and chestnut teal (*Anas castanea*) recorded at the site continue to be significant, exceeding 1% of their respective population thresholds.

The site currently meets two Ramsar criteria:

Criterion 4: Lake Gore regularly supports significant numbers of Australian shelducks (*Tadorna tadornoides*) during their vulnerable moulting phase by providing refuge habitat for this critical aspect of their life cycle. The Lake is also used as a drought refuge by large numbers of other resident and migratory waterbirds.

Criterion 6: More than 1% of the population of two waterbird species, Australian shelduck (*Tadorna tadornoides*) and chestnut teal (*Anas castanea*) are regularly recorded during counts at the site. Suitable habitat for feeding, roosting and breeding is maintained at the site.

The site may also meet Criterion 2 for a number of waterbird species. This will need to be confirmed in the next RIS update. The importance of the site as key habitat for nationally and/or internationally listed threatened species is currently a knowledge gap.

2 - Data & location

2.1 - Formal data

2.1.1 - Name and address of the compiler of this RIS

Responsible compiler

Institution/agency	Department of Climate Change, Energy, the Environment and Water
Postal address	GPO Box 3090 Canberra ACT 2601 Australia

National Ramsar Administrative Authority

Institution/agency	Department of Climate Change, Energy, the Environment and Water
Postal address	GPO Box 3090 Canberra ACT 2601 Australia

2.1.2 - Period of collection of data and information used to compile the RIS

From year	2003
To year	2023

2.1.3 - Name of the Ramsar Site

Official name (in English, French or Spanish)	Lake Gore
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2.1.4 - Changes to the boundaries and area of the Site since its designation or earlier update

(Update) A. Changes to Site boundary	Yes <input type="radio"/> No <input checked="" type="radio"/>
(Update) B. Changes to Site area	No change to area
(Update) For secretariat only: This update is an extension	<input type="checkbox"/>

2.1.5 - Changes to the ecological character of the Site

(Update) 6b i. Has the ecological character of the Ramsar Site (including applicable Criteria) changed since the previous RIS?	Uncertain
(Update) Optional text box to provide further information	
<p>Whilst there has been no notifiable change in ecological character, the Site has been subjected to a changing climate. Australia has warmed by an average of 1.47°C since 1910. Sea surface temperatures have risen by an average of 1.05°C, leading to an increase in the frequency of extreme heat events over land and sea. Australia is projected to experience further increases in temperatures, with more extremely hot days and fewer extremely cool days over the coming decades under all emissions scenarios. Warming over Australia is projected to be slightly higher than the global average.</p> <p>There has been a decline of around 15% in April to October rainfall in the south-west of Australia since 1970. Across the same region, May to July rainfall has seen the largest decrease, of around 19% since 1970. In the south-east of Australia, there has been a decrease of around 10% in April to October rainfall since the late 1990s. (BOM and CSIRO, State of the Climate 2022).</p> <p>These conditions will affect the critical components, processes and services of the Site. The adaptive capacity and resilience of the Site will be tested.</p> <p>A preliminary assessment regarding possible change in ecological character for this Site was undertaken in 2017 and found that no change in ecological character had occurred. The Ramsar Convention Secretariat was informed at the time.</p>	

2.2 - Site location

2.2.1 - Defining the Site boundaries

b) Digital map/image

<1 file(s) uploaded>

Former maps	0
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Boundaries description

The boundary of Lake Gore Ramsar Site consists of the whole of Nature Reserve 32419 and includes the part of Crown Reserve 26885 that is east of the truncation from the intersection of the south east corner of lot 1983 on plan 182935 and the eastern side of an intersecting vehicle track, continuing to follow south along the eastern side of the vehicle track to intersect with the lowest astronomical tide of the Southern Ocean.

2.2.2 - General location

- a) In which large administrative region does the site lie?
- b) What is the nearest town or population centre?

2.2.3 - For wetlands on national boundaries only

- a) Does the wetland extend onto the territory of one or more other countries? Yes ☐ No ☒
- b) Is the site adjacent to another designated Ramsar Site on the territory of another Contracting Party? Yes ☐ No ☒

2.2.4 - Area of the Site

Official area, in hectares (ha):

Area, in hectares (ha) as calculated from GIS boundaries

2.2.5 - Biogeography

Biogeographic regions

Regionalisation scheme(s)	Biogeographic region
Other scheme (provide name below)	South West Coast Drainage Division, Esperance Coast River Region

Other biogeographic regionalisation scheme

Australian Hydrological Geospatial Fabric (Geofabric) Topographic Drainage Divisions and River Regions (Australian Government Bureau of Meteorology, 2012). URL http://www.bom.gov.au/water/geofabric/documents/BOM002_Map_Poster_A3_Web.pdf.

The Australian Hydrological Geospatial Fabric (Geofabric) is a specialised Geographic Information System (GIS). It registers the spatial relationships between important hydrological features such as rivers, water bodies, aquifers and monitoring points. The National Topographic Drainage Divisions and River Regions are currently derived from Geofabric version 2. These provide a set of surface water reporting units based on drainage-enforced digital elevation models and are used to depict where water flows and drains across the landscape.

3 - Why is the Site important?

3.1 - Ramsar Criteria and their justification

<no data available>

☒ Criterion 2 : Rare species and threatened ecological communities

Optional text box to provide further information

The site may meet criterion 2 for the following species:

- hooded plover (*Thinornis rubricollis*, synonym: *Thinornis cucullatus*) (vulnerable - IUCN). The subspecies *Thinornis cucullatus tregellasi* has been recorded at the site.
- sharp-tailed sandpiper (*Calidris acuminata*) (vulnerable – IUCN and EPBC Act)
- black-tailed godwit (*Limosa limosa*) (endangered – EPBC Act)
- common greenshank (*Tringa nebularia*) (endangered – EPBC Act)
- great knot (*Calidris tenuirostris*) (vulnerable – EPBC Act)
- curlew sandpiper (*Calidris ferruginea*) (critically endangered – EPBC Act)

Hooded plover has only rarely been recorded within the Ramsar boundary, but is common in the adjacent Lake Carbul and Lake Kuich wetlands. Sharp-tailed sandpiper has rarely recorded within Ramsar boundary, but is likely to occur in the wetland complex in the south east part of the site, mostly in the Gore-Quallilup flow-through which is outside the Ramsar boundary. There are two records of black-tailed godwit from within the site (2010 and 2021), one in the Gore-Quallilup flow-through. Common greenshank is common in Gore-Quallilup system. There is one record of the great knot at Lake Carbul in 2019. Since 2006 there have been 2 records of curlew sandpiper, both outside the Ramsar site boundary. Based on these records, it appears these species might be using the broader wetland complex, but may also use the Ramsar site.

A variety of fish have been recorded at the site, including historic records (1974) for western trout minnow (*Galaxias truttaceus*), which is nationally listed as endangered. Further research is required to determine whether this species uses the site.

The importance of the site as key habitat for nationally and/or internationally listed threatened species is a knowledge gap.

☒ Criterion 4 : Support during critical life cycle stage or in adverse conditions

Optional text box to provide further information

Lake Gore is a drought refuge for many waterbirds and provides various waterbird feeding habitats from wading habitats to deeper water feeding habitats.

Lake Gore regularly supports internationally significant numbers of Australian shelduck (*Tadorna tadornoides*) which use the Site for shelter and safety during spring and summer for the critical moulting stage of their lifecycle. It is one of the most important moulting sites for shelducks in south-Western Australia (Jaensch et al., 1999). The rocky outcrops on the northern side of the lake provide critical shelter for the flightless shelducks during their moulting period. The maximum recorded count for Australian shelduck at the Site was 12,000 in November 1986. Regular counts indicate that this species is present in high numbers in most years.

Lake Gore provides drought refuge for other waterbird species including banded stilts (*Cladorhynchus leucocephalus*), hooded plover (*Thinornis cucullatus*) and chestnut teal (*Anas castanea*). In some years with higher water depths the wetlands to the south of Lake Gore support a breeding colony of little black cormorants (*Phalacrocorax sulcirostris*). This species continues to use Lake Gore and the southern wetlands but the breeding colony has been inactive since 2011.

Other species that use the Site at critical life stages in their life cycle include those that migrate along the East Asian Australasian Flyway and stop over at the Site for resting and feeding during the Australian summer. These include black-tailed godwit (*Limosa limosa*), curlew sandpiper (*Calidris ferruginea*), sharp-tailed sandpiper (*Calidris acuminata*) and great knot (*Calidris tenuirostris*).

End year

0

Optional text box to provide further information

Criterion 5 was considered to be met at the time of nomination based on the site including habitat likely to support large numbers of waterbirds. The 2009 ecological character description for the site reviewed the criteria for which the site was listed and found that the site did not meet this criterion at time of listing or since. An analysis of 27 years (1981 to 2008) of bird count data showed that the site has only been utilised by over 20,000 waterbirds on one recorded occasion (March 1988). In 2006 a maximum count of 17,000 waterbirds was recorded. However, this count included areas outside the Ramsar site boundaries.

The waterbird data for the site does not demonstrate that the site "regularly supports" more than 20,000 waterbirds. No subsequent counts have changed this finding.

☒ Criterion 6 : >1% waterbird population

Optional text box to provide further information

Lake Gore regularly supports greater than 1% of the population of three waterbird species:

- Australian shelduck (*Tadorna tadornoides*),
- chestnut teal (*Anas castanea*),

Lake Gore continues to support large numbers of Australian shelduck, with numbers exceeding 1% of the global population in nearly all years where counts have been undertaken since 2009. For example in February 2019 and November 2020 counts were 4061 (3.7%) and 2911 (2.7%) respectively.

Lake Gore continues to regularly support greater than 1% of the population for chestnut teal, with the threshold being exceeded in most years where counts have been recorded, since 2010. For example in November 2018 and February 2019 counts were 116 (2.3%) and 254 (5.1%) respectively.

A species previously recorded in numbers exceeding the 1% population threshold, but not recorded at levels to meet the "regularly supports" aspects of this criterion, is the banded stilt (*Cladorhynchus leucocephalus*) (highest count of 20,000 recorded in 1988).

The western hooded plover (*Thinornis cucullatus tregallasi*) did not exceed the 1% population threshold for this RIS based on accepted waterbird population numbers (WPE 5), but does according to more recent population numbers (Singor et al 2021). This species will need to be reassessed in future RIS under Criterion 6 as population data sources are updated.

3.2 - Plant species whose presence relates to the international importance of the site

<no data available>

3.3 - Animal species whose presence relates to the international importance of the site

Phylum	Scientific name	Species qualifies under criterion				Species contributes under criterion				Pop. Size	Period of pop. Est.	% occurrence 1)	IUCN Red List	CITES Appendix I	CMS Appendix I	Other Status	Justification
		2	4	6	9	3	5	7	8								
Birds																	
CHORDATA/ AVES	<i>Anas castanea</i>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	254	2019	5.1	LC	<input type="checkbox"/>	<input type="checkbox"/>		This species contributes to the diversity and abundance of waterbirds at the site. C6: This species regularly exceeds the 1% population threshold of 50 birds (SW Australia population, published in WPE5). C4: The site provides breeding, feeding and roosting habitat. The site may also provide drought refuge.
CHORDATA/ AVES	<i>Calidris acuminata</i>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	243	2020		VU	<input type="checkbox"/>	<input type="checkbox"/>	Nationally listed (EPBC Act) - vulnerable, migratory	C4: This species may use the site and broader wetland areas for non-breeding habitat and as a stopover point on northward and southward migration. This species contributes to the diversity and abundance of waterbirds within the region. C2: Nationally and internationally listed threatened species. The importance of the site as key habitat for this species is a knowledge gap.
CHORDATA/ AVES	<i>Calidris ferruginea</i>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>				NT	<input type="checkbox"/>	<input type="checkbox"/>	Nationally listed (EPBC Act) – critically endangered, marine, migratory	C4: This species may use the site and broader wetland areas for non-breeding habitat and as a stopover point on northward and southward migration. C2: Nationally listed threatened species. The importance of the site as key habitat for this species is a knowledge gap.

Phylum	Scientific name	Species qualifies under criterion				Species contributes under criterion				Pop. Size	Period of pop. Est.	% occurrence 1)	IUCN Red List	CITES Appendix I	CMS Appendix I	Other Status	Justification
		2	4	6	9	3	5	7	8								
CHORDATA/ AVES	<i>Calidris ruficollis</i>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	130	2019		NT	<input type="checkbox"/>	<input type="checkbox"/>	Nationally listed (EPBC Act) - marine, migratory	C4: This species may use the site and broader wetland areas for non-breeding habitat and as a stopover point on northward and southward migration. The importance of the site as key habitat for this species is a knowledge gap. This species contributes to the diversity and abundance of waterbirds at the site
CHORDATA/ AVES	<i>Calidris tenuirostris</i>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>				EN	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Nationally listed (EPBC Act) – vulnerable, marine, migratory	C4: This species may use the site and broader wetland areas for non-breeding habitat and as a stopover point on northward and southward migration. C2: Nationally and internationally listed threatened species. The importance of the site as key habitat for this species is a knowledge gap.
CHORDATA/ AVES	<i>Limosa limosa</i>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>				NT	<input type="checkbox"/>	<input type="checkbox"/>	Nationally listed (EPBC Act) – endangered, marine, migratory	C4: This species may use the site and broader wetland areas for non-breeding habitat and as a stopover point on northward and southward migration. C2: Nationally listed threatened species. The importance of the site as key habitat for this species is a knowledge gap.
CHORDATA/ AVES	<i>Tadorna tadornoides</i>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	2911	2020	2.7	LC	<input type="checkbox"/>	<input type="checkbox"/>		C4: Shelduck use the Site during the critical moulting stage of their life cycle (DEC 2009) C6: The Site regularly supports more than 1% of the global population of this species. At time of current assessment 1% of the SW Australian Population of Australian Shelduck is 1100 birds (Wetlands International 2023).
CHORDATA/ AVES	<i>Thinornis cucullatus</i>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>				VU	<input type="checkbox"/>	<input type="checkbox"/>		The birds present at the Site are subspecies <i>Thinornis cucullatus</i> (Western Australia population) (also known as <i>Thinornis cucullatus tregellasi</i> or <i>Thinornis rubricollis tregellasi</i>). C2. At the species level, <i>Thinornis cucullatus</i> is listed as vulnerable under the IUCN Redlist.
CHORDATA/ AVES	<i>Tringa nebularia</i>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	15	2020		LC	<input type="checkbox"/>	<input type="checkbox"/>	Nationally listed (EPBC Act) - endangered, marine, migratory	This species contributes to the diversity and abundance of waterbirds at the site. C4: This species uses the site and broader wetland areas for non-breeding habitat and as a stopover point on northward and southward migration. The importance of the site as key habitat for this species is a knowledge gap.

1) Percentage of the total biogeographic population at the site

3.4 - Ecological communities whose presence relates to the international importance of the site

<no data available>

4 - What is the Site like? (Ecological character description)

4.1 - Ecological character

Critical components and processes for the site are:

- **Hydrology:** The site is mainly surface water fed from the Dalyup catchment, with some groundwater influence. Lake Gore is shallow and permanently inundated. Altered hydrological regime has caused increases in the extent and duration of inundation at the site. The hydrological regime provides habitat for a diversity of waterbirds.
- **Geomorphology:** The site is confined by a granite escarpment to the north and dunes to the south. Lake Gore is a broad shallow basin.
- **Water quality:** waterbodies are brackish and saline to hypersaline, alkaline and nutrient enriched. Algal blooms have been recorded.
- **Physical processes:** sedimentation occurs at an increased rate since catchment clearing and this has implications for bathymetry and the hydrological regime.
- **Soils:** clay-based soils are present along with alkaline sediments, elevated nutrient concentrations and potential acid sulfate soils.
- **Biota:** The highest waterbird count of over 20,000 birds was recorded at the site in 1988, however such significant numbers have not been recorded since. More than 50 bird species have been recorded, approximately half of which are nationally listed as marine or migratory under the EPBC Act. Species meeting Ramsar criterion 6 are Australian shelduck and chestnut teal.
Aquatic invertebrates provide a food supply for many waterbird species. Species richness at Lake Gore is low and species composition has been variable. A variety of fish have been recorded including western trout minnow (*Galaxias truttaceus*, nationally listed as endangered), blue spotted gobi or Swan River gobi (*Pseudogobius olorum*), and black bream (*Acanthopagrus butcheri*). Hardy head (*Leptatherina wallacei*) and *Pseudogobius olorum* have also been recorded in the lower Dalyup River where it terminates at Lake Gore. Lake Gore has fringing vegetation consisting of saltwater paperbark (*Melaleuca cuticularis*). The high water mark of Lake Gore consists of zigzag bogsedge (*Schoenus brevifolius*) and coast saw-sedge (*Gahnia trifida*), samphire species (*Suaeda australis* and *Sarcocornia quinqueflora*) and the grass species, sand couch (*Sporobolus virginicus*) and herb, sea primrose (*Samolus repens*). The saltwater paperbark is replaced by wattles (*Acacia* sp.) as the elevation increases on the northerly side of Lake Gore.

Critical benefits and services include:

- **Provisioning services:** The site provides an environment conducive to the continuation of human health and wellbeing.
- **Regulating:** Lake Gore is a sink for excessive nutrients, sediments and saline water discharges from the Dalyup catchment.
- **Cultural services:** Lake Gore is used by Indigenous people and provides "sense of place". The site also provides for recreation activities such as bird watching. There are opportunities for science-based education and the Site provides scenic values to residents and visitors which are in addition to others in the scenically rich area.
- **Supporting services:** These include hydrological processes, nutrient cycling, biodiversity, physical habitat, important wetland species and ecological connectivity. For example, Lake Gore supplies water to nearby Lake Quallilup and other smaller unnamed lakes and swamps in the Lake Gore wetland system and has a role in nutrient cycling although the scale at which this occurs is unknown.
The site provides varied waterbird habitats and is a drought refuge during summer periods. Habitat varies within the Ramsar site from wetland to terrestrial, offering habitat for wetland and terrestrial dependent species. It supports diversity of waterbird habitat from wading to deep water. The site forms part of an interconnected habitat of wetlands for waterbirds in the Esperance region.

4.2 - What wetland type(s) are in the site?

Inland wetlands

Wetland types (code and name)	Local name	Ranking of extent (1: greatest - 4: least)	Area (ha) of wetland type	Justification of Criterion 1
Saline, brackish or alkaline water > Lakes >> Q: Permanent saline/brackish/alkaline lakes	Lake Gore	0	740	
Saline, brackish or alkaline water > Lakes >> R: Seasonal/intermittent saline/brackish/alkaline lakes and flats	Wetlands downstream of Lake Gore	1	1433	
Saline, brackish or alkaline water > Marshes & pools >> Ss: Seasonal/intermittent saline/brackish/alkaline marshes/pools	Wetlands downstream of Lake Gore	0		

Other non-wetland habitat

Other non-wetland habitats within the site	Area (ha) if known
Banksia woodland	
Banksia mixed heath	
Coastal heath	
Coastal shrubland	
Melaleuca woodland	
samphire	

(ECD) Habitat connectivity

The Lake Gore Ramsar Site forms part of this interconnected habitat of wetlands for waterbirds in the Esperance region. These corridors allow movement of flora and fauna and connect various habitat types.

4.3 - Biological components

4.3.1 - Plant species

Other noteworthy plant species

Phylum	Scientific name	Position in range / endemism / other
TRACHEOPHYTALILIOPSIDA	<i>Gahnia trifida</i>	critical component of ecological character
TRACHEOPHYTAMAGNOLIOPSIDA	<i>Melaleuca cuticularis</i>	critical component of ecological character
TRACHEOPHYTAMAGNOLIOPSIDA	<i>Salicornia quinqueflora quinqueflora</i>	critical component of ecological character
TRACHEOPHYTAMAGNOLIOPSIDA	<i>Samolus repens</i>	critical component of ecological character
TRACHEOPHYTALILIOPSIDA	<i>Schoenus brevifolius</i>	critical component of ecological character
TRACHEOPHYTALILIOPSIDA	<i>Sporobolus virginicus</i>	critical component of ecological character
TRACHEOPHYTAMAGNOLIOPSIDA	<i>Suaeda australis</i>	critical component of ecological character

Invasive alien plant species

Phylum	Scientific name	Impacts	Changes at RIS update
TRACHEOPHYTALILIOPSIDA	<i>Aira cupaniana</i>	Potential	No change
TRACHEOPHYTALILIOPSIDA	<i>Asparagus asparagoides</i>	Actual (minor impacts)	No change
TRACHEOPHYTALILIOPSIDA	<i>Briza maxima</i>	Potential	No change
TRACHEOPHYTALILIOPSIDA	<i>Briza minor</i>	Potential	No change
TRACHEOPHYTALILIOPSIDA	<i>Bromus diandrus</i>	Potential	No change
TRACHEOPHYTALILIOPSIDA	<i>Bromus hordeaceus</i>	Potential	No change
TRACHEOPHYTALILIOPSIDA	<i>Bromus rigidus</i>	Potential	No change
TRACHEOPHYTALILIOPSIDA	<i>Ehrharta calycina</i>	Actual (minor impacts)	No change
TRACHEOPHYTALILIOPSIDA	<i>Ehrharta longiflora</i>	Potential	No change
TRACHEOPHYTAMAGNOLIOPSIDA	<i>Hypochaeris glabra</i>	Potential	No change
TRACHEOPHYTALILIOPSIDA	<i>Juncus bufonius</i>	Potential	No change
TRACHEOPHYTAMAGNOLIOPSIDA	<i>Leptospermum laevigatum</i>	Actual (minor impacts)	No change
TRACHEOPHYTAMAGNOLIOPSIDA	<i>Lysimachia arvensis</i>	Potential	No change
TRACHEOPHYTALILIOPSIDA	<i>Parapholis incurva</i>	Potential	No change
TRACHEOPHYTAMAGNOLIOPSIDA	<i>Polycarpon tetraphyllum</i>	Potential	No change
TRACHEOPHYTALILIOPSIDA	<i>Polypogon monspeliensis</i>	Potential	No change
TRACHEOPHYTAMAGNOLIOPSIDA	<i>Rumex crispus</i>	Potential	No change
TRACHEOPHYTAMAGNOLIOPSIDA	<i>Sonchus oleraceus</i>	Potential	No change
TRACHEOPHYTAMAGNOLIOPSIDA	<i>Trifolium campestre</i>	Potential	No change
TRACHEOPHYTAMAGNOLIOPSIDA	<i>Ursinia anthemoides</i>	Potential	No change

4.3.2 - Animal species

Other noteworthy animal species

Phylum	Scientific name	Pop. size	Period of pop. est.	% occurrence	Position in range /endemism/other
CHORDATA/ACTINOPTERYGII	<i>Acanthopagrus butcheri</i>				critical component of sites ecological character
MOLLUSCA/GASTROPODA	<i>Coxiella exposita</i>				important food for hooded plover
CHORDATA/ACTINOPTERYGII	<i>Galaxias truttaceus</i>				This species forms part of the "fish" critical component of sites ecological character. However, further research is required to determine whether the species occurs at the site.
CHORDATA/ACTINOPTERYGII	<i>Leptatherina wallacei</i>				critical component of sites ecological character
CHORDATA/ACTINOPTERYGII	<i>Pseudogobius olorum</i>				critical component of sites ecological character

Optional text box to provide further information

The site is thought to supports a number of animal species at critical stages in their life cycles, or provide refuge during adverse conditions, that are not currently assessed as contributing to other Ramsar criteria. The site provides feeding, nesting and roosting habitat, and may also provide drought refuge for:

- Himantopus himantopus (black-winged stilt)
- Ardea alba (Great egret)
- Charadrius ruficapillus (red-capped plover)
- Poliocephalus poliocephalus (hoary-headed grebe)

The site provides breeding, feeding and roosting habitat, and may also provide drought refuge, for:

- Recurvirostra novaehollandiae (red-necked avocet)
- Anas gracilis (grey teal)

The site historically provided breeding habitat for Phalacrocorax sulcirostris (little black cormorant).

The site provides drought refuge for Cladorhynchus leucocephalus (banded stilt).

A list of species present at the site is included in the Ecological Character Description attached to this RIS update.

4.4 - Physical components

4.4.1 - Climate

Climatic region	Subregion
C: Moist Mid-Latitude climate with mild winters	Csb: Mediterranean (Mild with dry, warm summer)

Lake Gore lies within the southern and south-western flatlands west sub-region in Western Australia. Here, under global climate change, average temperatures will continue to increase in all seasons, with more hot days and warm spells. There will be a continuing trend of decreasing winter & spring rainfall. More intense extreme rainfall events are expected and mean sea level will continue to rise and the height of extreme sea level events will increase. A harsher fire-weather climate is projected. These conditions will impact the Site's hydrological regime, in turn affecting all critical components, processes and services.

Source: Climate change in Australia. Regional climate change explorer - Southern and south-western flatlands west. URL <https://www.climatechangeinaustralia.gov.au/en/projections-tools/regional-climate-change-explorer/su b-clusters/?current=SSWSW&tooltip=true&popup=true>

4.4.2 - Geomorphic setting

a) Minimum elevation above sea level (in metres)

a) Maximum elevation above sea level (in metres)

Entire river basin ☐

Upper part of river basin ☐

Middle part of river basin ☐

Lower part of river basin ☒

More than one river basin ☐

Not in river basin ☐

Coastal ☐

Please name the river basin or basins. If the site lies in a sub-basin, please also name the larger river basin. For a coastal/marine site, please name the sea or ocean.

The Site lies within the South-West Coast Australian Drainage Division. Within this drainage division, the Site is in the Esperance Coast River Region (BOM 2012).

On a smaller scale, the Site is part of the Dalyup River catchment. The southern boundary of the Site joins the Southern Ocean. Lake Gore however, has no confirmed direct hydrological connection with the Southern Ocean and is therefore described as a sub-terminal basin. It is possible that some palaeodrainage features exist east of Lake Gore and are a likely output to the Southern Ocean (Street & Abbott, 2005).

4.4.3 - Soil

Mineral ☒

(Update) Changes at RIS update ☒ No change ☐ Increase ☐ Decrease ☐ Unknown ☐

No available information ☐

Are soil types subject to change as a result of changing hydrological conditions (e.g., increased salinity or acidification)? Yes ☐ No ☒

Please provide further information on the soil (optional)

Soils of the Site are characterised as alkaline grey sandy duplex soils, pale deep sands and saline wet soils. The components of the lithology of the lacustrine sediments of Lake Gore itself consist of an upper marl unit of carbonate rich clay; a middle gypsum/clay unit; a carbonate nodule clay unit; and a basal marl unit (Wilson, 2003).

For more detail about the Site's soil see the Ecological Character Description (Department of Environment and Conservation, 2009) included at section 6.1.2ii.

4.4.4 - Water regime

Water permanence

Presence?	Changes at RIS update
Usually seasonal, ephemeral or intermittent water present	unknown
Usually permanent water present	unknown

Source of water that maintains character of the site

Presence?	Predominant water source	Changes at RIS update
Water inputs from groundwater	<input type="checkbox"/>	unknown
Water inputs from surface water	<input checked="" type="checkbox"/>	unknown
Water inputs from precipitation	<input type="checkbox"/>	unknown

Water destination

Presence?	Changes at RIS update
Marine	No change
To downstream catchment	No change

Stability of water regime

Presence?	Changes at RIS update
Unknown	No change

Please add any comments on the water regime and its determinants (if relevant). Use this box to explain sites with complex hydrology.

The main hydrological input for Lake Gore is the Dalyup catchment, which has an annual flow of approximately 11,000 ML (Pen, 1999). The Dalyup catchment consists of the Dalyup and West Dalyup Rivers and their confluence is approximately 8 km north of Lake Gore. Other hydrological inputs for Lake Gore are derived from the Coobidge Creek catchment, which flows into Lake Gore through Carbul, Kubitch and Gidong Lakes. Coobidge Creek has an annual flow of approximately 3,800 ML (Brearley, 2005). There is some groundwater seepage from aquifers surrounding the Ramsar Site, including a perched aquifer in the Quaternary dunes to the south, however, the amounts are not quantified (Street & Abbott, 2005). Rainfall contributes directly to the water budget of the Site and also indirectly via the surrounding landscape through runoff from the northern granite escarpment and the surrounding catchments. An inter-connected system of seasonal wetlands within the Site are fed by Lake Gore and the seasonally flowing Coobidge Creek catchment. When Lake Gore fills, it overflows via "Overflow Swamp" into Quallilup Lake, which is outside the Ramsar Site's boundary (DEC 2009).

4.4.5 - Sediment regime

Significant erosion of sediments occurs on the site ☐

(Update) Changes at RIS update No change ☐ Increase ☐ Decrease ☐ Unknown ☒

Sediment regime unknown ☒

Please provide further information on sediment (optional):

Land clearing to make way for agriculture in the Dalyup and the Coobidge Creek catchments has resulted in a significant reduction in native vegetation. This increased surface water runoff and reduced sediment entrapment, therefore increasing sediment transportation. These sediment loads subsequently make their way into the Dalyup River, depositing greater sediment loads than what would be expected in a vegetated catchment (DEC 2009).

4.4.6 - Water pH

Circumneutral (pH: 5.5-7.4) ☒

(Update) Changes at RIS update No change ☒ Increase ☐ Decrease ☐ Unknown ☐

Alkaline (pH>7.4) ☒

(Update) Changes at RIS update No change ☒ Increase ☐ Decrease ☐ Unknown ☐

Unknown ☐

Please provide further information on pH (optional):

Lake Gore is considered to be alkaline and the available data suggest that the lake has not been affected by acidity. Average pH based on data from June 2006 - October 2014 is 8.3, ranging between 7 and 9.3 (personal communication Department of Biodiversity Conservation and Attractions).

4.4.7 - Water salinity

Mixohaline (brackish)/Mixosaline (0.5-30 g/l) ☒

(Update) Changes at RIS update No change ☒ Increase ☐ Decrease ☐ Unknown ☐

Euhaline/Eusaline (30-40 g/l) ☒

(Update) Changes at RIS update No change ☒ Increase ☐ Decrease ☐ Unknown ☐

Hyperhaline/Hypersaline (>40 g/l) ☒

(Update) Changes at RIS update No change ☒ Increase ☐ Decrease ☐ Unknown ☐

Unknown ☐

Please provide further information on salinity (optional):

Salinity at Lake Gore remained relatively stable during September to November between 1979 and 2020. At that time mean salinity concentrations were saline to hypersaline. There is a strong inverse relationship between water depth and salinity at Lake Gore. More recently, higher water levels have been experienced at times, likely from combined effects of higher groundwater levels associated with previous catchment clearing and periods of unseasonal high rainfall (DEC 2009). Conductivity measurements taken between 2009 and 2014 suggested Lake Gore is likely to be brackish (Personal communication, DBCA). However, a single water sample collected in November 2020 indicates that salinity in Lake Gore can exceed that of seawater as the measure of total dissolved solids was approx. 48,000 mg/L. Seawater is approx. 34,000 mg/L. Data needs to be collected on finer timescales to understand how salinity at Lake Gore changes within and between years.

4.4.8 - Dissolved or suspended nutrients in water

Eutrophic ☐(Update) Changes at RIS update No change ☐ Increase ☐ Decrease ☐ Unknown ☒Mesotrophic ☐(Update) Changes at RIS update No change ☐ Increase ☐ Decrease ☐ Unknown ☒Oligotrophic ☐(Update) Changes at RIS update No change ☐ Increase ☐ Decrease ☐ Unknown ☒Dystrophic ☐(Update) Changes at RIS update No change ☐ Increase ☐ Decrease ☐ Unknown ☒Unknown ☒

4.4.9 - Features of the surrounding area which may affect the Site

Please describe whether, and if so how, the landscape and ecological characteristics in the area surrounding the Ramsar Site differ from the site itself: i) broadly similar ☐ ii) significantly different ☒

Surrounding area has greater urbanisation or development ☐Surrounding area has higher human population density ☐Surrounding area has more intensive agricultural use ☐Surrounding area has significantly different land cover or habitat types ☐

Please describe other ways in which the surrounding area is different:

In the eastern Esperance area, there are several small watercourses, including Thomas River and near pristine rivers with catchments less than 20% cleared including Jenamullup, Jorndee, Poison and Fern creeks. Conversely, Dalyup River, which feeds into Lake Gore, has 80% or more of its catchment cleared and, along with the Munglinup, Young and Lort rivers, has been identified as eutrophic (DPAW 2016).

4.5 - Ecosystem services

4.5.1 - Ecosystem services/benefits

Regulating Services

Ecosystem service	Examples	Importance/Extent/Significance
Pollution control and detoxification	Water purification/waste treatment or dilution	High

Cultural Services

Ecosystem service	Examples	Importance/Extent/Significance
Recreation and tourism	Recreational hunting and fishing	Medium
Recreation and tourism	Water sports and activities	Medium
Recreation and tourism	Nature observation and nature-based tourism	Medium
Spiritual and inspirational	Aesthetic and sense of place values	not relevant for site
Scientific and educational	Long-term monitoring site	Medium
Scientific and educational	Important knowledge systems, importance for research (scientific reference area or site)	Medium

Supporting Services

Ecosystem service	Examples	Importance/Extent/Significance
Biodiversity	Supports a variety of all life forms including plants, animals and microorganisms, the genes they contain, and the ecosystems of which they form a part	Medium
Nutrient cycling	Storage, recycling, processing and acquisition of nutrients	Medium

Optional text box to provide further information

The critical ecosystem benefits and services for the Lake Gore system are summarized in section 4.1 of this RIS. A more detailed account can be found in the Ecological Character Description (DEC 2009), which attached under section 6.1.2ii.

Have studies or assessments been made of the economic valuation of ecosystem services provided by this Ramsar Site? Yes ☐ No ☐ Unknown ☒

4.5.2 - Social and cultural values

i) the site provides a model of wetland wise use, demonstrating the application of traditional knowledge and methods of management and use that maintain the ecological character of the wetland ☐

ii) the site has exceptional cultural traditions or records of former civilizations that have influenced the ecological character of the wetland ☐

iii) the ecological character of the wetland depends on its interaction with local communities or indigenous peoples ☐

iv) relevant non-material values such as sacred sites are present and their existence is strongly linked with the maintenance of the ecological character of the wetland ☐

<no data available>

4.6 - Ecological processes

(ECD) Nutrient cycling	Lake Gore has a role in nutrient cycling although the scale at which this occurs is unknown.
(ECD) Notable species interactions, including grazing, predation, competition, diseases and pathogens	Phytophthora dieback, present at the site, is a pathogen introduced into Australia that kills plants by destroying root systems, leaving the plants unable to take up nutrients and water.
(ECD) Notable aspects concerning animal and plant dispersal	The Site forms part of interconnected habitat of wetlands for waterbirds in Esperance region. The Site could be part of the south coast "macro-corridor" which is a near continuous strip of native coastal vegetation.
(ECD) Notable aspects concerning migration	Waterbirds that migrate along the East Asian Australasian Flyway stop over at the Site for resting and feeding during the Australian summer.

5 - How is the Site managed? (Conservation and management)

5.1 - Land tenure and responsibilities (Managers)

5.1.1 - Land tenure/ownership

Public ownership

Category	Within the Ramsar Site	In the surrounding area
National/Federal government	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

Private ownership

Category	Within the Ramsar Site	In the surrounding area
Other types of private/individual owner(s)	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Provide further information on the land tenure / ownership regime (optional):

The Lake Gore Ramsar Site is state nature reserve - Nature Reserve 32419 (Lake Gore) for the purpose of "Water and conservation of flora and fauna" and the eastern part of Nature Reserve 26885 for the "Conservation of flora". These Reserves are vested in the Conservation Commission. The southern boundary of the Site extends to the high tide mark of the Southern Ocean.

5.1.2 - Management authority

Please list the local office / offices of any agency or organization responsible for managing the site:

Esperance District,
Western Australian Department of Biodiversity, Conservation and Attractions.

Postal address:

PO Box 234
Esperance, WA 6450
Australia

E-mail address:

enquiries@dbca.wa.gov.au

5.2 - Ecological character threats and responses (Management)

5.2.1 - Factors (actual or likely) adversely affecting the Site's ecological character

Water regulation

Factors adversely affecting site	Actual threat	Potential threat	Within the site	Changes	In the surrounding area	Changes
Salinisation	Medium impact	Medium impact	<input type="checkbox"/>	No change	<input checked="" type="checkbox"/>	No change

Agriculture and aquaculture

Factors adversely affecting site	Actual threat	Potential threat	Within the site	Changes	In the surrounding area	Changes
Wood and pulp plantations		Medium impact	<input type="checkbox"/>	No change	<input checked="" type="checkbox"/>	No change

Natural system modifications

Factors adversely affecting site	Actual threat	Potential threat	Within the site	Changes	In the surrounding area	Changes
Unspecified/others	Medium impact	Medium impact	<input checked="" type="checkbox"/>	No change	<input checked="" type="checkbox"/>	No change

Invasive and other problematic species and genes

Factors adversely affecting site	Actual threat	Potential threat	Within the site	Changes	In the surrounding area	Changes
Invasive non-native/ alien species	Low impact	Medium impact	<input checked="" type="checkbox"/>	No change	<input checked="" type="checkbox"/>	No change

Pollution

Factors adversely affecting site	Actual threat	Potential threat	Within the site	Changes	In the surrounding area	Changes
Agricultural and forestry effluents	Medium impact	Medium impact	<input checked="" type="checkbox"/>	No change	<input type="checkbox"/>	No change

Please describe any other threats (optional):

Threats to the ecological character of the Site include (but are not limited to):

- agricultural activities within the catchment
- introduction or spread of non-native (invasive) species
- climate change
- recreational activities

See the Ecological Character Description for more information (DEC 2009).

5.2.2 - Legal conservation status

National legal designations

Designation type	Name of area	Online information url	Overlap with Ramsar Site
Nature Reserve (26885)	Warrenup Lakes Nature Reserve	https://www.dbca.wa.gov.au/management/plans/esperance-and-recherche-parks-and-reserves	partly
Nature Reserve (32419)	Lake Gore Nature Reserve	https://www.dbca.wa.gov.au/management/plans/esperance-and-recherche-parks-and-reserves	whole

Non-statutory designations

Designation type	Name of area	Online information url	Overlap with Ramsar Site
Important Bird Area	Lake Gore IBA	http://datazone.birdlife.org/site/factsheet/lake-gore-system-iba-australia	whole

5.2.3 - IUCN protected areas categories (2008)

- Ia Strict Nature Reserve ☐
- Ib Wilderness Area: protected area managed mainly for wilderness protection ☐
- II National Park: protected area managed mainly for ecosystem protection and recreation ☒
- III Natural Monument: protected area managed mainly for conservation of specific natural features ☐
- IV Habitat/Species Management Area: protected area managed mainly for conservation through management intervention ☐
- V Protected Landscape/Seascape: protected area managed mainly for landscape/seascape conservation and recreation ☐
- VI Managed Resource Protected Area: protected area managed mainly for the sustainable use of natural ecosystems ☐

5.2.4 - Key conservation measures

Legal protection

Measures	Status
Legal protection	Implemented

Other:

In Australia, the ecological character of a designated Ramsar Site is protected as a matter of national environmental significance (MNES) under the Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act).

The Western Australian Department of Conservation, Biodiversity and Attractions (DBCA) administers the Conservation and Land Management Act 1984 (CALM Act), which provides for the management of lands and waters vested in the Conservation and Parks Commission and the Wildlife Conservation Act 1950, which provides specific protection for native flora and fauna within Western Australia. The site is a declared Nature Reserve under Conservation and Land Management Act 1984. The DBCA also administers the Biodiversity and Conservation Act 2016 (BC Act) for WA which is the key state legislation for Ramsar. The BC Act aims to conserve and protect biodiversity and biodiversity components in the State; and to promote the ecological sustainable use of biodiversity components. It is the statutory basis for the listing of threatened species, specially protected species, threatened ecological communities, critical habitat and key threatening processes. It establishes a mechanism for protecting WA's native plant and animal taxa, and enforces more robust protection of WA's biodiversity. The BC Act includes provisions for ecological communities, critical habitats, threatening processes, environmental pests and introduced plants species. Many of the Ramsar Sites in WA are known biodiversity hotspots found with both State and Commonwealth listed threatened species or communities.

5.2.5 - Management planning

Is there a site-specific management plan for the site? No

Has a management effectiveness assessment been undertaken for the site? Yes ☐ No ☒

If the site is a formal transboundary site as indicated in section Data and location > Site location, are there shared management planning processes with another Contracting Party? Yes ☐ No ☒

5.2.6 - Planning for restoration

Is there a site-specific restoration plan? No need identified

Further information

The DBCA works with Natural Resource Management groups and key stakeholders to reduce the impacts of major threats such as climate change, invasive species and modified hydrology effecting the lake water levels and increased salinity by looking for revegetation opportunities, implementing weed and feral animal control and best practice management for agricultural drainage.

5.2.7 - Monitoring implemented or proposed

The South Coast Natural Resource Management Group together with the DBCA have undertaken several surveys for water birds, water quality and vegetation over the years. Regular monitoring for key variables against limits of acceptable change for reporting is proposed but is dependent on successful funding via the Australian National Landcare Program.

6 - Additional material

6.1 - Additional reports and documents

6.1.1 - Bibliographical references

This RIS has been prepared based on information from the Ecological character description of the Ramsar site; past Ramsar Information Sheets; the Esperance and Recherche Parks and Reserves Management Plan; and other relevant sources. A full bibliography is included as an attachment under Section 6.1.2 vi., under the name, " AU1049_lit230713__bibliography.docx"

6.1.2 - Additional reports and documents

i. taxonomic lists of plant and animal species occurring in the site (see section 4.3)

<no file available>

ii. a detailed Ecological Character Description (ECD) (in a national format)

<1 file(s) uploaded>

iii. a description of the site in a national or regional wetland inventory

<no file available>

iv. relevant Article 3.2 reports

<no file available>

v. site management plan

<1 file(s) uploaded>

vi. other published literature

<1 file(s) uploaded>

6.1.3 - Photograph(s) of the Site

Please provide at least one photograph of the site:



Lake Gore, view across (Department of Biodiversity, Conservation and Attractions, 12-12-2001)



Lake Gore, view across (Department of Biodiversity, Conservation and Attractions, 12-12-2001)



Lake Gore, with vegetation (Department of Biodiversity, Conservation and Attractions, 12-12-2001)



Lake Gore, with vegetation (Department of Biodiversity, Conservation and Attractions, 12-12-2001)



Lake Gore, view across (Department of Biodiversity, Conservation and Attractions, 12-12-2001)

6.1.4 - Designation letter and related data

Designation letter

<1 file(s) uploaded>

Date of Designation 2001-01-05