



Site options profile #L11

Lake Bonney - Draft

Lock 3 Master Plan



Location: Weir Pool 3, River Chainage Markers 438 (connection)
Land Tenure: Crown Land [Berri Barmera Council and River Murray and Mallee Aboriginal Corporation (RMMAC) managed]

Wetland Size: 1,700 hectares (Ha)
Normal Pool Level: +9.8 mAH

PROPOSED OPTIONS	
Option #1:	Improve wetland and floodplain condition by promoting variable water levels created through weir pool manipulation (lowering and raising) and high flow events.
Description	The main inlet to the wetland is positioned to exploit the benefits associated weir pool manipulation (WPM). This presents an opportunity to increase the extent of managed floodplain area and have greater control of watering frequency through weir pool raising. Weir pool lowering (WPL) will expose significant areas of substrate otherwise permanently inundated and promote the active transport of floodplain matter and nutrients, including salt, back to river. Preliminary desktop investigations have identified that raising and lowering by +/-60 cm at flows of 20 gigalitres (GL) would increase opportunities for improving managed floodplain extent (raising) and exposed substrate (lowering) whilst mitigating risk associated with water quality and improving the health of native vegetation. The <i>Caring for Country Management Plan</i> for Lake Bonney states that in co-operation with the Department for Environment and Water (DEW), water level manipulation via Lock 3 would provide an opportunity to improve fringing vegetation around the edges of Lake Bonney and potentially reduce surface water salinity. It is anticipated that this action will improve the condition and diversity of vegetation around the lake edge. It will also help to lower the salinity of the water in Lake Bonney by releasing salty water from the lake during lowering by re-filling the lake with lower salinity water from the river¹. Preliminary modelling indicates that through regular WPM activities with intermittent high-flow events, salt levels in the lake can be managed and maintained; with salt levels remaining below risk thresholds within the river at key locations. However, hydrodynamic modelling and monitoring demonstrates that during the recession of high-flow events and weir pool manipulation, Loch Luna receives an influx of salt from Lake Bonney, which persists in the wetland, before receding back into Lake Bonney. This option includes an investigation on how best to protect Loch Luna from any salt influx from Lake Bonney as it supports weir pool manipulation and high-flow events in the Lock 3 reach.
Outcomes	• Benefits associated with an improved water regime. • Conservation and improvement of wetland vegetation. • Improved soil moisture conditions. • Improved lateral connectivity. • Provision of fresh water recharge to salt-affected floodplains. • Improved recreational and tourism opportunities whilst ensuring environmental benefits.
Option #2:	Investigate the desired short and long-term ecological, cultural, social and economic outcomes for Lake Bonney, including benefits associated with reduced salt and the solutions needed to achieve them (e.g. salt interception, WPM, water pumping, etc.).
Description	A number of community driven proposals exist that seek to outline the management of Lake Bonney, including the desired salt level to support outcomes. This option seeks to investigate the short and long-term outcomes for Lake Bonney and the water quality conditions required to achieve them and the potential solutions (e.g. salt interception, WPM, water pumping, etc.) for salt reduction within Lake Bonney. For example, preliminary modelling suggests export of saline water via a pipe from the southern end of the lake to the main channel would provide significant salinity benefits, while allowing management for reach-wide targets.

SITE BACKGROUND

Description

Lake Bonney is located above Lock 3 and next to the township of Barmera. It is located adjacent the Loch Luna wetland complex and is connected to the River Murray via Chambers Creek. Lake Bonney is the largest permanent lake in South Australia upstream of Wellington, with a volume of approximately 59,000 megalitres (ML). Surrounding land use includes agriculture on the north and west side and recreation areas and local businesses on the south side of the lake. The lake is approximately 7 km long and 3.5 km wide, covering an area of about 1,700 hectares (Ha) at normal pool level. It has an average depth of 1 to 2 m with a maximum depth of approximately 4 m².

Cultural Significance

The River Murray and Mallee Aboriginal Corporation (RMMAC) holds native title over the River Murray within the Lock 3 Reach. The First Peoples intimate knowledge and understanding of Country and active participation across all levels is vital to the effective management of this landscape.

RMMAC and Berri Barmera Council established a Memorandum of Understanding (MOU) dated 23 September 2014, which provided a framework to guide administration of joint acre, control and management arrangements of lands around Lake Bonney that are subject to native title determination.

Post-colonial Use

Prior to the regulation of flows in the River Murray and the construction of locks and weirs, Lake Bonney would have had a more variable water regime. The stabilisation of water levels has led to permanent inundation of low-lying areas and reduced frequency and duration of inundation events.

WETLAND ECOLOGY

Lake Bonney was assessed by Thompson (1986) and Jensen (1996) as having a high to moderate conservation value because of the enormous size and depth which provides habitat for a large amount of species usually associated with the main river channel. It is extensively used for spawning by fish during floods, and is an important breeding area for tortoises and a large number of waterbirds use the Lake^{3,4}.

The floodplain surrounding Lake Bonney is highly modified and dominated by river red gum (*Eucalyptus camaldulensis*) and black box (*Eucalyptus largiflorens*) open woodland, over a sparse grassy understorey and open chenopod shrubland^{2,5}. The Lake's ecological value is reduced by its high salinity levels which limit the diversity of species and vegetation within and surrounding the Lake. The last official vegetation survey only found fragments of submerged aquatic vegetation in a small bay on the western side of the Lake⁵ and reported that the overall tree health was generally poor².

The Lake is an important breeding ground for the 3 species of River Murray tortoises, Short-necked (*Emydura macquarii*), Long-necked (*Chelodina longicollis*) and Broad-shelled (*Chelodina expansa*)^{3,6}.

WETLAND MANAGEMENT

Current Management:

Lake Bonney has high cultural, environmental and social value to Barmera and the Riverland communities. Recreational activities include boating, fishing, camping, and swimming. There are commercial camp parks located on the lakeshore (e.g. Camp Kedron and Barmera North Lake Caravan Park) as well as various undesigned areas where free camping has not been restricted.

Infrastructure:

Lake Bonney is connected by an inlet at the north-western side of the lake through Chambers Creek, which ultimately joins the River Murray near Cobdogla. As a significant volume of water evaporates annually (over 26 GL per year), most of the water recharge occurs via the river with some groundwater inflows.

ISSUES AND DRIVERS

As part of the Master Planning Project engagement process, an ongoing register of issues and drivers relating to sites and options was maintained. These highlighted key considerations and investigations that would need to be factored in and undertaken as part of any next steps towards realising the outcomes described within the option profiles. For Lake Bonney, these included:

Environmental

- Potential risks include reducing the ecological health of Loch Luna by increasing its salinity in the process of exporting salt from Lake Bonney. The overall risk of soil acidification and water acidification in Lake Bonney is considered to be low⁷.
- May allow reed establishment around Lake Bonney which will help reduce wave impacts.

Cultural

- Lake Bonney is a significant cultural site with co-management arrangements between RMMAC and council.
- Construction works need to be mindful not to disturb areas of cultural importance.

- Bush Tucker Gardens are being proposed and RMMAC want protection of cultural assets, good plant growth and barriers to vehicle movements.

Community/Social

- Concerns that “excessive” recovery of aquatic plants could affect recreational tourism opportunities, such as boating, for the lake.

Operational/logistics

- Need to determine whether the connection at Nappa Bridge will dry under a WPL of 60cm.
- Need to understand requirements for freshening the whole lake vs half of the lake.
- The Macintosh canal should remain an option as it can protect Loch Luna from salinity impacts.

KEY STAKEHOLDER INVOLVEMENT

- Berri Barmera Council
- Berri Barmera Council - Environment and Sustainability Committee
- Berri Barmera Council - Lake Bonney Caring for Country Advisory Committee
- Berri Barmera Landcare
- Central Irrigation Trust (CIT)
- Commonwealth Environmental Water Office (CEWO)
- Loxton Waikerie Council
- Loxton Waikerie Landcare
- Murraylands and Riverland Landscape Board
- National Parks and Wildlife Service SA
- Overland Corner Group
- River Murray and Mallee Aboriginal Corporation (RMMAC)
- South Australian Murray Irrigators (SAMI)
- SA Water

REFERENCES

1. Berri Barmera Council. Lake Bonney / Barmera – Caring for Country Management Plan 2018-2023.
2. Tonkin Consulting. Lake Bonney and Loch Luna Management Options Assessment. SA Murray-Darling Basin Natural Resources Management Board; 2010 Jun.
3. Thompson MB. River Murray Wetlands - Their Characteristics, Significance and Management. Adelaide: University of Adelaide for the Department of Environment and Planning and the Nature Conservation Society of South Australia; 1986.
4. Jensen A, South Australia, Department of Environment and Natural Resources, South Australian River Murray Wetlands Management Committee. Wetlands atlas of the South Australian Murray Valley: a summary of current knowledge of Murray Valley wetlands as a basis for integrated catchment management. Adelaide: Dept. of Environment and Natural Resources; 1996.
5. Marsland K, Nicol J. 2006 River Murray Wetlands Baseline Survey. :66.
6. Ecological Associates. Management Options Assessment for Lake Bonney and Loch Luna: Ecological Objectives. prepared for Tonkin Consulting on behalf of Department of Water, Land and Biodiversity Conservation, South Australia.; 2010. Report No.: Ecological Associates report AQ011-1-A.
7. Shand P, Merry RH, Fitzpatrick RW, Thomas M. Acid sulfate soil assessment of disconnected wetlands between Lock 1 and Lock 5, River Murray, South Australia. CSIRO: Water for a Healthy Country National Research Flagship.; 2009 p. 197.



Lake Bonney jetty near the township

Lake Bonney looking towards the surf club



Lake Bonney

Inundation Extents

-  5GL - At pool conditions
-  20GL 59cm - Weir Pool Raise
-  20GL 60cm - Weir Pool Lower
-  Murray Flood 1956

Option #1



Produced by Water Infrastructure and Operations Branch
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Data Source DEW - TOPO, Aerial Imagery 2014, DEM,
Wetland Structures, Model Flow Extents
30 June 2021

Compiled South Australia Lambert
Projection Datum GDA 1994

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MSA 2020-070

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