

Communications Plan

Lake Albert Scoping Study

Lake Albert Scoping Study – communicating project outcomes

July 2014

Background

The Lake Albert Scoping Study commenced in January 2013 and has now been completed. The objective of the project was to investigate a range of potential management actions that could be implemented to improve and maintain water quality in Lake Albert. Potential management actions include; dredging the Narrung Narrows, removing or modifying the Narrung Causeway, installing a permanent water regulating structure in the Narrung Narrows, installing a pipe/channel between Lake Albert and the Coorong (Coorong Connector) and the manipulation of lake levels (Lakes Cycling).

The Project commenced with a Literature Review to assist in the identification of potential management actions and gain insight into previous investigations. A Community Requirements Study was carried out by an independent market research company to ascertain community wants and needs for the lake, and opinions on each of the potential management actions.

Evaluation of the potential management actions included a preliminary desktop modelling investigation and a qualitative multi-criteria engineering analysis. All of the management actions were still considered feasible at the conclusion of these studies.

A Legislative Review was completed to provide an indication of what approvals may be required for each management action.

MSM BigMod modelling was completed for all management actions other than the permanent regulating structure. This was due to the technical nature of the operational rules for the regulating structure. BigMod modelling suggested the Coorong Connector and Lakes Cycling were effective management actions. Increasing the conveyance in the Narrung Narrows, i.e. increasing the ability of water to flow between the lakes, was not shown to have substantial benefit. The modelling also indicated removal or modification of the Narrung causeway and dredging of the Narrung Narrows would not be effective in reducing salinity in Lake Albert.

TUFLOW FV modelling was completed for all management actions. This modelling showed the Coorong Connector was technically the most effective management action in reducing salinity in Lake Albert and there was also benefit provided by Lakes Cycling. It indicated dredging Narrung Narrows and removing or modifying Narrung Causeway would have negligible benefit for Lake Albert salinity and that a permanent regulating structure was shown to increase Lake Albert salinity.

While the modelling was being undertaken, topographic, ecological, geotechnical and Acid Sulfate Soil investigations were carried out at all potential management action sites. The results of these on-site investigations did not discount the feasibility of any management action.



An Engineering Feasibility Study was completed for the Coorong Connector and Dredging Narrung Narrows options. The Connector was estimated at approximately \$19 million and the dredging at around \$126 million.

A Cost Benefit Analysis was completed for the Coorong Connector and suggested a marginal benefit (0.3-0.41). The irrigated land area would have to increase to 5,179 to 5,607 Ha to 'breakeven' and the previous historical peak was 2,801 Ha in 2005. Approximately 400 Ha are currently irrigated.

A Position Paper has also been prepared by the Ngarrindjeri Regional Authority that does not support any engineering interventions.

An Options Paper has been developed to summarise project findings for each potential management action.

Objectives

The purpose of the Communications Plan is to provide the community with:

- familiarity as to what was undertaken as part of the Lake Albert Scoping Study
- an understanding of how each management action was evaluated
- the modelling results
- an understanding of design options and costs
- the future of Lake Albert under the Basin Plan
- the State's position on project outcomes

Target audiences

Internal

- Minister for Water and the River Murray
- DEWNR Executive
- Regional staff, DEWNR
- Lake Albert Project Steering Committee
- Lake Albert Project Advisory Group
- Australian Government

External

- Lake Albert Community Reference Group
- Coorong, Lower Lakes and Murray Mouth Community Advisory Panel
- Meningie Narrung Lakes Irrigator's Association
- Coorong District Council
- Ngarrindjeri Regional Authority
- Tribal Owners of the River Murray, Coorong, Lakes and the Sea Incorporated
- Broader Lake Albert Community
- Murray-Darling Basin Association
- Regional Development Australia Murraylands and Riverland



Key messages

The following key messages were endorsed in January 2014 by the Lake Albert Scoping Study Steering Committee.

General Project

- The key project objective was improvement in water quality in Lake Albert, particularly salinity. The Project considered both recovery from drought and also maintenance of salinity within the historic range of 1000-2000EC.
- Studies completed include a Literature Review, Community Requirements Study, Preliminary modelling review, qualitative engineering feasibility study, Legislative Review, On-ground Investigations (geotechnical, topographic, ecological and Acid Sulfate Soil), modelling studies (MSM BigMod and TUFLOW FV), an Engineering Feasibility Study, Cost Benefit Analysis, Ngarrindjeri Regional Authority Position Paper and an Options Paper.
- The Options Paper has been developed to summarise all the studies completed as part of the Scoping Study.
- Any preferred management action/s would undergo further assessment of ecological, social, cultural and economic impacts.

Decision making process

- The Lake Albert Steering Committee (SC) included representatives from the Department of Environment, Water and Natural Resources (DEWNR), SA Water, the Department of Planning, Transport and Infrastructure (DPTI), the Environment Protection Authority (EPA), and the Murray-Darling Basin Authority (MDBA), with Commonwealth Department of the Environment (DoE) observers. The SC considered the options and made project recommendations to the South Australian Minister for Water and the River Murray. The Murray-Darling Basin Coordinating Committee noted the project recommendations.
- Project recommendations were directed by the results of all studies and papers completed as part of the Scoping Study.
- The Basin Plan has been considered during investigations and was integral in evaluating the proposed management actions.

Management Action Investigations

Removal or modification of Narrung Causeway

- This option aimed to achieve water quality improvements through full or partial removal of the Narrung Causeway to improve flows between the two lakes, including the installation of infrastructure such as culverts within the existing causeway to improve flow whilst retaining the causeway in its current location.
- Modelling suggested this management action has negligible benefit for Lake Albert salinity.
- DPTI advised that removing (either partially or fully) would significantly reduce the ability of the ferry service to operate 24/7 with significant impact on the local community. The Narrung ferry has the largest alternate route of any ferry in South Australia.
- This management action did not proceed to the engineering feasibility stage.



Dredging Narrung Narrows

- This option aimed to achieve water quality improvements through dredging sediment along the Narrung Narrows to optimise wind driven flow between the two lakes.
- Modelling shows this management action has negligible benefit for Lake Albert salinity.
- A volume of six million cubic metres was 'dredged' in the computer model to represent a maximum depth and width improvement in the Narrung Narrows. This represented dredging of the entire length of the Narrows, 250 metres wide and 2 metres deep.
- As this maximum dredged profile did not yield favourable modelling results, lesser dredge profiles were not modelled. This was based on the assumption that dredging less would provide the same or reduced benefit.
- This option still progressed to the engineering feasibility stage to obtain approximate costs.
- Dredging 6 million cubic metres is estimated to cost approximately \$126 million. This figure includes treating the dredged sediment on land.
- Considering the current dredging rates, removing even 1 million cubic metres would still yield a cost of \$19.8 million.
- On land disposal was selected for this exercise as disposing of 6 million cubic metres in water would not be practical (it would mean along the 12 km length of the Narrows, sediment would need to be piled 100 m in width and 2.5 m high, on each side of the Narrows).
- Dredging is shown not to be effective in reducing Lake Albert salinity, as although the flow exchange between the lakes is increased, mixing in Lake Albert still needs to occur and this is a factor reliant upon wind. It was found that under some modelling scenarios, dredging resulted in a worse result than the Base Case. It is thought that when the width of the Narrows is significantly greater, the same tranche of water flowed in and out quickly, without mixing and therefore not resulting in salt export from Lake Albert.
- This management action did not proceed to the Cost Benefit Analysis stage.

Permanent Regulator in Narrung Narrows

- This option aimed to achieve water quality improvements through the construction of a permanent water regulating structure within the Narrung Narrows channel to enable the manipulation of water levels between the two lakes, as a means of controlling inflow and outflow and managing water quality.
- Modelling showed the Permanent Regulator would potentially make salinity worse in Lake Albert as the structure prevents flow exchange between the lakes and impedes wind benefits.
- This management action did not proceed to the engineering feasibility stage.

Coorong Connector

- This option aimed to achieve water quality improvements through constructing a channel or pipe between Lake Albert and the Coorong North Lagoon to improve salt export from Lake Albert.
- The Coorong Connector was shown by the modelling to be the most effective management action in quickly reducing Lake Albert salinity. Modelling shows the Coorong Connector can reduce salinity in the lake to around 1000 EC within approximately 16 months and maintain salinity for the rest of the model run (3 years total).
- This option proceeded to the engineering feasibility stage.
- Both a channel and series of pipes were considered, and it was found a channel would be more cost effective and offer easier operation and maintenance.
- No pumping would be required as the channel would rely on gravity flow.



- It was proposed that the Coorong Connector would be constructed from Bascombe Bay to the North Lagoon of the Coorong. Of the three options considered, this option is considered the most feasible given the water access and reasonable depth in Lake Albert, and topography and distance across Narrung Peninsula.
- Dredging would be required in Lake Albert to achieve sufficient water draw into the channel. Dredging would also be required into the Coorong at the outflow.
- One GL/day was found to be the optimum flow rate for salinity reduction, with a maximum flow rate of 300 GL per annum.
- The Coorong Connector is estimated to cost \$19 million. Geotechnical and topographic investigations were completed as part of the Scoping Study, which have built-in a degree of confidence in this dollar figure.
- There would be a requirement for significant ecological investigations and legislative approvals should this management action proceed to the next stage of feasibility.
- The Coorong Connector is technically feasible in reducing salinity in Lake Albert as suggested by the modelling and pre-feasibility engineering study. However, the costs substantially outweigh the benefits (the benefit-cost ratio is 0.30-0.41). The Benefit Cost ratio is marginal at 0.30 to 0.41, and is related to the area of land irrigated.
- The "breakeven" land area at which the project's costs equal its benefits is between 5,179 Ha and 5,607 Ha. Presently, 400 Ha is under irrigation, with a historic peak of 2,801 Ha in 2003. Consultation with the Community Reference Group indicates that the level of irrigation production is highly unlikely to return to even historic levels due to current market demands, cost of re-establishing infrastructure and the availability of suitable land.
- The time delay in realising the benefits from the Connector is also a limitation. If the project were to commence in 2014, the operation and outcomes from the Connector would not be realised any sooner than through normal river operations or lake cycling. Therefore, the Connector would not provide immediate water quality benefits. However, the Connector would ensure quick recovery following periods of increased salinity, should they occur in the future.
- The Coorong Connector is currently not feasible due to the cost and time required to implement this infrastructure.
- Later in the Project, the concept of Temporary Reset Pumping was formed. This management action would be similar to the Coorong Connector, but consist of temporary piping and pumps and only be implemented following a drought should the Basin Plan fail to maintain water levels in the lakes. This option has not been costed.

Lakes Cycling

- This option aimed to achieve water quality improvements through utilising existing barrage operating strategies between Lake Alexandrina and the Coorong to vary lake water levels. The general concept is that by filling Lake Albert with fresher water, allowing mixing, and then drawing down the water level in Lake Alexandrina, water (and salt) will be drawn out of Lake Albert and discharged through the barrages.
- Two different Lakes Cycling strategies were modelled and both were shown to benefit Lake Albert salinity.
- This management action was not required to be considered in the engineering feasibility study as it does not require new infrastructure.
- Lakes Cycling requires complex river operations as Lake Alexandrina and the pool level above Wellington needs to be carefully considered. Consideration of Coorong water levels and barrage operations are also necessary for this management action.



- Lakes Cycling is a technically feasible and low cost option to reduce salinity in Lake Albert.

Basin Plan

- The Basin Plan aims to achieve water quality improvements through providing river inflows into the Lower Lakes to maintain water level in the lakes and a target salinity level in Lake Alexandrina.
- Under the Basin Plan, a repeat of the hydrological conditions seen in the 2006-2010 Millennium Drought would not produce the same conditions in the Lower Lakes.
- Under the Basin Plan 2800 GL/year scenario, there would only be two periods in a 114 year span where Lake Albert experiences salinity over 2,500 EC and these periods would be for a mean duration of 115 days. This is in contrast to 13 periods of 190 days (mean duration) under a baseline scenario with no Basin Plan. Without a Basin Plan, there would be 23 periods of around 360 days where salinity in Lake Albert exceeds 2,000 EC. With the Plan, this is reduced to 6 periods or around 180 days.
- Modelling shows that, under the Basin Plan, Lake Albert water levels will remain above 0.0 m AHD for the foreseeable future, and the frequency and duration of high salinity events will be significantly reduced.

Main findings from the options paper

State Position

1. Lakes Cycling be continued and augmented to manage salinity in Lake Albert.

Lakes Cycling will continue via DEWNR river operations, in partnership with SA Water and the Murray-Darling Basin Authority. A proposal is also being developed for Australian Government funding consideration to investigate options for more active variation of lake levels to enhance lake cycling.

2. The Coorong Connector option will not be pursued as costs and time frames to realise benefits do not achieve project outcomes.
3. The Temporary Reset Pumping should be investigated as an emergency action should the Basin Plan not maintain Lake Albert salinity levels.

The Temporary Reset Pumping proposal aims to recover water quality quickly after a drought period through pumping high salinity water from Lake Albert to the Coorong prior to refilling with fresh River Murray water. Temporary Reset Pumping should provide the community with assurance that if the Basin Plan does not maintain water levels, Lake Albert water quality will recover more quickly than experienced during the recent drought.

Communications approach

Approach

The Project has actively sought to collaborate with the community through the Lake Albert Scoping Study Community Reference Group. This group met approximately monthly throughout the project and was encouraged to drive aspects of the project, such as the Community Requirements Study. The broader community has been kept informed throughout the project through media releases and



presentations and open discussion events. This Communications Plan is aimed at informing the community, but the process may offer the opportunity for further collaboration. The communication strategy will occur over a 1 week timeframe to ensure all community groups are informed in a timely manner.

1. Publically release the Options Paper, including the summary of the Options Paper and the Literature Review

These documents will be publically released and made available on the DEWNR website and Lakes Hub website.

2. Media release

A media release will be prepared to share website links for the Options Paper and Literature Review. The broader community and Irrigator's Association meeting (see item 7) will be advertised.

3. Key Community Contacts

The Chair and key members of the Community Reference Group will be briefed on the project outcomes. These Community Reference Group members will serve as contacts for inquiries about the project from other Community Reference Group members and community members. This will help mitigate mixed messages and keep the information aligned to the key messages. It will also be an opportunity to 'test' the delivery of the information to ensure it can be easily understood and resolve any gaps or issues early on in the communication.

Key individuals on this group include Mr Neil Shillabeer (Chair, Community Reference Group), Mr Clem Mason (member Community Reference Group), and Mr Tim Hartman (Ngarrindjeri Regional Authority).

4. Briefing – Community Reference Group

A presentation (see attached powerpoint) will be made to the Community Reference Group.

5. Briefing – Ngarrindjeri through KNYA forum

A presentation (see attached powerpoint) will be made to Ngarrindjeri Regional Authority at a KNYA Taskforce meeting.

6. One on One meetings – Irrigators and Tribal Owners

One-on-one meetings will be held with interested individuals to ensure the key messages are fully understood. Individuals will be met at a location and time that suits them. The objectives of the meetings will be made clear to the individuals prior to meeting.

Key individuals include Ms Lesley Fisher and Mr Sam Dodd (dairy irrigators), and Mr Mark Koolmatrie and Mr Derek Gollan (Tribal Owners of the River Murray, Coorong, Lakes and the Sea Incorporated).

7. Briefing – Meningie Narrung Lakes Irrigator's Association/broader community

A presentation (see attached powerpoint) will be made to the Meningie Narrung Lakes Irrigator's Association (MNLIA) meeting. In the past, the MNLIA has run the meeting and published an invitation in the local paper for the broader community to attend. Preparing an open invitation will be discussed with the Chair of the MNLIA.

8. Media release

A final media release will be prepared to summarise project outcomes and recommendations and advertise the availability of reports.



Supporting information

Lake Albert Scoping Study Options Paper summary (Attachment A)

This is a 2 page document that summarises the effectiveness of each management action. It will be available for download from the DEWNR website and made available in hard copy from Meningie Hub.

Lake Albert Options Graph (Attachment B)

This graph compares the Coorong Connector, Lakes Cycling and the Temporary Reset Pumping Project in terms of anticipated salinity benefit, estimated project cost and timeframes. The other management actions are not included as the modelling does not show them to be effective in meeting the project objective.

The graph was prepared to illustrate the options in selecting a preferred management action at this time. The Coorong Connector is technically the most effective management action in reducing salinity in the shortest period from implementation. However, when considering the capital expenditure and operations and maintenance requirements along with the timeframe to gain funding and approvals, implement the action and realise the benefits, it does not provide sufficient benefits for the level of investment.

Lakes Cycling is effective in reducing salinity in Lake Albert under most scenarios. It doesn't have any additional capital expense and can be delivered as part of routine barrage operations. It is a management action already being undertaken so does not have any lag time in implementation.

While the expenditure for the Coorong Connector cannot be justified at present due to the extended timeline to realise benefits, in a recovery situation, it would be a useful emergency recovery management action. A Temporary Reset Pumping Project could also be implemented in the event of a drought. The salinity benefits could be the same as the Coorong Connector and implementation could be quicker as it is thought there would be fewer approvals compared with a permanent measure.

The graph will be used as a discussion tool only, rather than distributed, as there are a few assumptions made that would need to be explained.

Powerpoint Presentation (Attachment C)

The powerpoint presentation will be the main tool used in explaining the project findings and outcomes. The structure of the powerpoint is consistent with that of the Options Paper where each management action is addressed in turn. Graphs and animations will be utilised to illustrate the modelling results. This material has already been shared with all the groups during the project but it will be important to revisit this information to summarise the project findings.

Budget and resources

No budget is required to carry out the Communications Plan. The required staff are available to implement the plan.

Communications contact

Theresa Andrew, Project Manager Lake Albert, (08) 8463 4435, theresa.andrew@sa.gov.au



Lake Albert Scoping Study Outcomes

Project Background

The Lake Albert Scoping Study commenced in January 2013 and has investigated a range of potential management actions to reduce and maintain salinity in Lake Albert.

The Project has been directed by an intergovernmental Steering Committee with technical input from a state government Project Advisory Group. A Community Reference Group has met approximately monthly throughout the project and acted as a conduit between the community and government.

The project has included;

- Literature Review
- Community Requirements Study
- Preliminary Modelling Investigation
- Qualitative Engineering Study
- Legislative Review
- MSM BigMod Modelling
- TUFLOW FV Modelling
- On ground investigations (geotechnical, ecological, topographic and acid sulfate soil)
- Engineering Feasibility Investigation
- Cost Benefit Analysis
- Options Paper

The main study outcomes are listed for each potential management action below.

Permanent Regulating Structure in Narrung Narrows

- Community generally opposed to the concept and Ngarrindjeri specifically do not support engineering interventions
- Modelling showed it increased salinity in Lake Albert
- Would be expensive to build and operate

Removal or modification of Narrung Causeway*

- Community generally in support
- Modelling showed negligible benefit to Lake Albert

- Removing the Causeway would impact the ferry operation. Without the ferry, this is the longest alternate route in SA and constructing a bridge would be expensive.

Dredging Narrung Narrows*

- Community generally in support
- The logic was to model the greatest dredge volume first and if benefits were found, the dredged volume would be reduced until there was an optimum benefit/effort ratio
- 5-6 million cubic metres were 'dredged' in the model to make the Narrows a minimum of 200m wide and 2m deep. If this volume of sediment was displaced in the Narrows, the pile would be 2.5m high and 100 m wide along both sides of the 12 km Narrows. To put it in perspective, a total of about 6.5 m cubic metres was dredged at the Murray Mouth over a course of 8 years and this was a 24/7 operation.
- For this large effort, the modelling showed negligible benefit to Lake Albert, and under high wind conditions there was a negative impact to Lake Albert salinity.
- Dredging could cost around \$120 m and the Narrows would require ongoing maintenance.

Lakes Cycling

- Community generally see this as slow and non-effective process
- Modelling showed Lakes Cycling would benefit Lake Albert salinity
- Minimal costs associated with Cycling. Specific costs are yet to be determined

Coorong Connector*

- Some general community support; Ngarrindjeri specifically do not support any engineering intervention

- Modelling shows it to be technically feasible in reducing Lake Albert salinity within the shortest timeframe, under the Basin Plan.
- A channel was selected over a pipeline due to construction cost, maintenance and overall footprint
- Dredging would be required 200 m into Lake Albert and 700 m into the Coorong to achieve the necessary invert levels to provide the required flow of 1 GL/day, up to 300 GL/year
- There are significant legislative requirements for this option
- The pre-feasibility cost estimate is \$19 m +/- 30 % for a channel from Bascombe Bay to the Coorong (see the alignment below)
- The benefit cost is 0.30 to 0.41
- For the project to breakeven, irrigation would have to increase to around 5,500 Ha. The historic peak was 2,801 Ha in 2005 and the current figure is 400 Ha.
- Otherwise, the environmental, social and cultural benefits would need to equate to \$13.12m to \$15.12m in addition to irrigation increasing to 1980 Ha or 1320 Ha respectively.
- It is likely that Lake Albert would return to its historical salinity range by the time a Connector could be constructed and in operation.
- Coorong Connector is most useful in a recovery situation following drought. However, the Basin Plan reduces the frequency and duration of high salinity events anyway.
- As a contingency emergency measure should the Basin Plan not maintain Lake Albert salinity levels under extreme conditions not previously experienced, 'temporary reset pumping' could be implemented following a significant drought event. A temporary measure would have less environmental and cultural impact.



Alignment 2 runs from Bascombe Bay in Lake Albert to the Coorong and would be the preferred location

For more information

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Meningie SA 5264

www.nrm.sa.gov.au

*Management actions included as part of the Meningie Narrung Lakes Irrigators Association's 5 Point Plan. The other management actions in the Plan are Removal of Narrung Bund (completed) and return of flows to the South Lagoon of Coorong (part of the South East Flow Restoration Project).



Australian Government



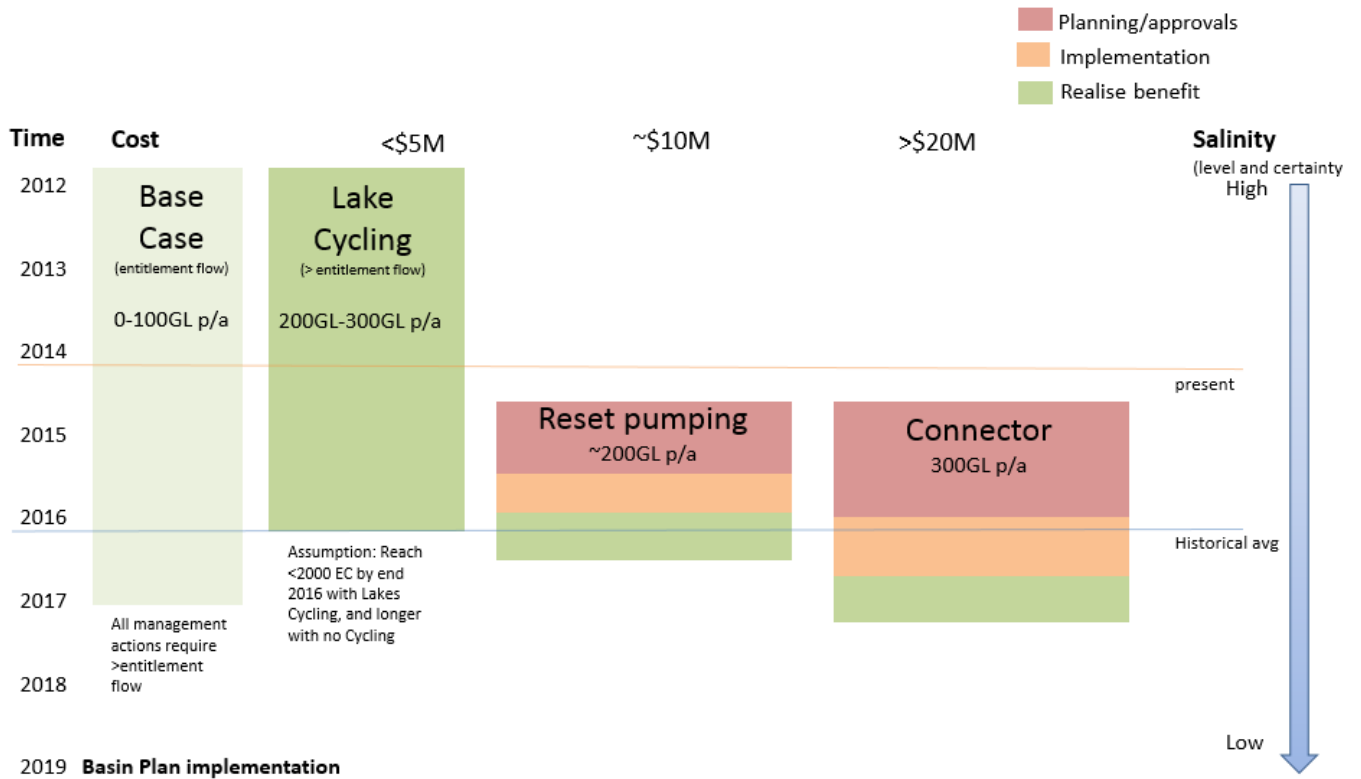
Government
of South Australia



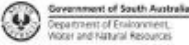

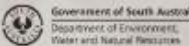
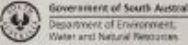
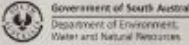
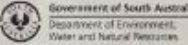
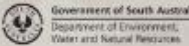
Government of South Australia
Department of Environment,
Water and Natural Resources

Attachment B – Lake Albert Options

Lake Albert Options



Attachment C – Draft Lake Albert Scoping Study Outcomes powerpoint presentation

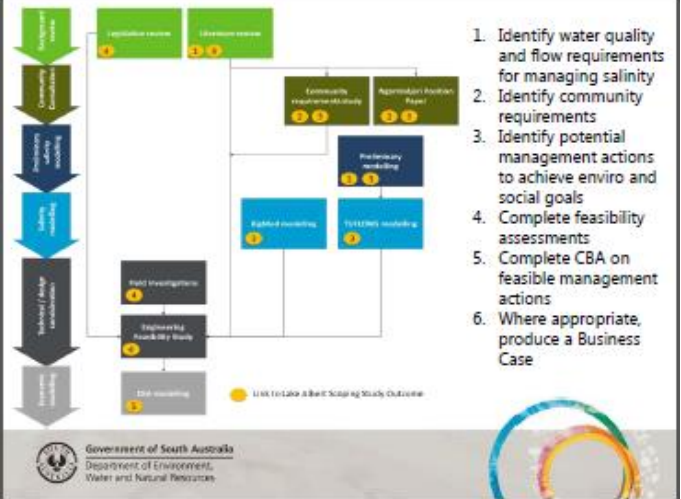
<h2>LAKE ALBERT SCOPING STUDY OUTCOMES</h2> <p>Theresa Andrew, Project Manager Lake Albert</p> <p>July 2014</p> 	<h3>Contents</h3> <ul style="list-style-type: none"> • Problem definition • Project objectives • Governance • Methodology • Project outcomes per management action • Current and predicted salinity • Basin Plan • Project recommendations • Next steps  
<h3>Problem definition</h3> <ol style="list-style-type: none"> 1. Lake Albert's prolonged recovery from the high salinity levels during the 2006-2010 drought is leading to community concerns about the social and economic consequences for the region 2. There is uncertainty about the ability of government's planned interventions to provide longer term water quality certainty to businesses and the community 	<h3>Relevant CLLMM Long Term Plan objectives</h3> <ul style="list-style-type: none"> • the lake remains predominantly freshwater and operates at variable water levels, • its biological and ecological features are protected, • there is a return of amenity for local residents and their communities, • there are adequate flows of suitable quality water to maintain Ngarrindjeri cultural life, • tourism and recreation businesses can utilise the lake and • productive and profitable primary industries continue. 
<h3>Project Objective</h3> <p>The objective of the Lake Albert Scoping Study was to investigate potential management actions under different climate scenarios to sustain water quality and ecological health in Lake Albert.</p> 	<h3>Intended Benefits</h3> <ul style="list-style-type: none"> • Facilitate shorter and more predictable recovery from high salinity in Lake Albert following drought periods • Provide the certainty needed for irrigators and other industries to continue operating and potentially expanding in the region • Recognise the Basin Plan intended outcomes 



Governance



- Steering Committee
- Community Reference Group
- Project Advisory Group

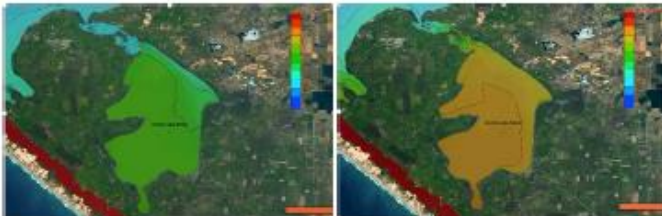


Potential Management Actions

- Base Case (do nothing)
- Dredging Narrung Narrows
- Removal or partial removal of Narrung Causeway
- Modification of Narrung Causeway (culverts)
- Permanent Water Regulating Structure in Narrung Narrows
- Lakes Cycling
- Coorong Connector (channel, pipes and Temporary Reset Pumping)

Base Case (do nothing)

- No management action is implemented
- Assumes Basin Plan 2800 GL/year
- Management actions modelled against Base Case



Base Case

5000EC / 400EC
2010 winds
Low flow, med evaporation

Base Case

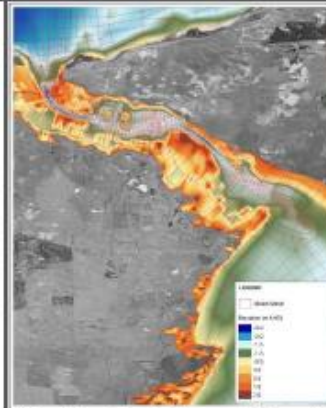
5000EC / 400EC
2008 winds
Low flow, med evaporation

Dredging Narrung Narrows

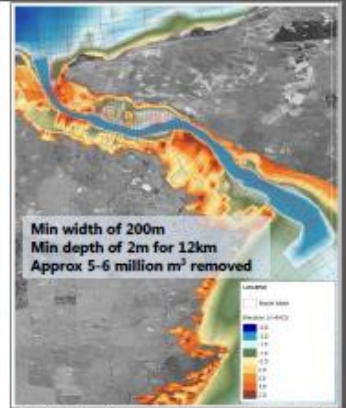
- Maximum dredge tested first = 5-6 million cubic metres, Narrows would be minimum 200 m wide and 2 m deep
- Displaced sediment would be 2.5 m high and 100 m wide along both sides of the 12km Narrows
- A total of about 6.5m cubic metres was dredged at the Murray Mouth over 8 years as a 24/7 operation.
- Not effective in improving Lake Albert salinity
- Estimated cost = \$120 m plus ongoing maintenance
- Not considered further

Removal or modification of Narrung Causeway

- Full removal modelled as part of the maximum dredging scenario
- No benefit for Lake Albert salinity
- Major impact on ferry operation. Without the ferry, this is the longest alternate route in SA and constructing a bridge would be expensive.
- Not considered further



Base Case Mesh Narrung Narrows Delineation
Scale: 0.45



Dredged Mesh Narrung Narrows Delineation
Scale: 2.12



Dredging/Removal of Causeway
5000EC / 400EC
2008 winds
Low flow, med evaporation



Base Case
5000EC / 400EC
2008 winds
Low flow, med evaporation



Dredging/Removal of Causeway
5000EC / 400EC
2010 winds
Low flow, med evaporation



Base Case
5000EC / 400EC
2010 winds
Low flow, med evaporation



Dredging/Removal of Causeway
2000EC / 700EC
2010 winds
Low flow, med evaporation



Base Case
2000EC / 700EC
2010 winds
Low flow, med evaporation



1963 shortly after
Causeway constructed –
assumed water level
+0.75 m AHD



2006/07 – assumed
water level -0.3 m AHD

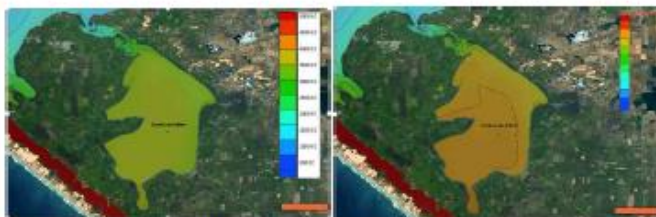


Permanent Water Regulating Structure in Narrung Narrows

- Infrastructure to enhance Lakes Cycling
- Modelling showed it increased salinity in Lake Albert
- Would be expensive to build and operate
- Not considered further

Lakes Cycling

- Modelling indicated lakes cycling was an effective management action
- Time and cost effective management action
- Recommended to continue and be augmented to manage salinity in Lake Albert

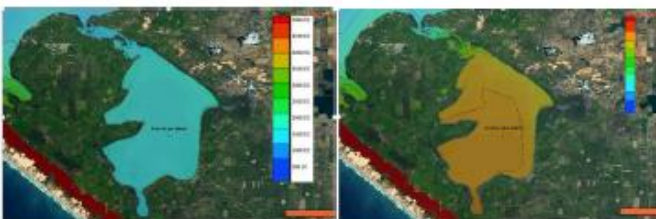


Lakes Cycling 0.25m change
5000EC / 400EC
2008 winds
Low flow, med evaporation

Base Case
5000EC / 400EC
2008 Winds
Low flow, med evaporation

Coorong Connector

- Technically feasible
- Optimal = 1GL/day, up to 300GL/year
- 3 alignments considered, Bascombe Bay preferable
- Channel preferable to pipes due to cost, footprint and maintenance
- Dredging would be required 200m into Lake Albert and 700m into the Coorong
- Estimated cost = \$19 m +/- 30%



Coorong Connector
5000EC / 400EC
2008 winds
Low flow, med evaporation

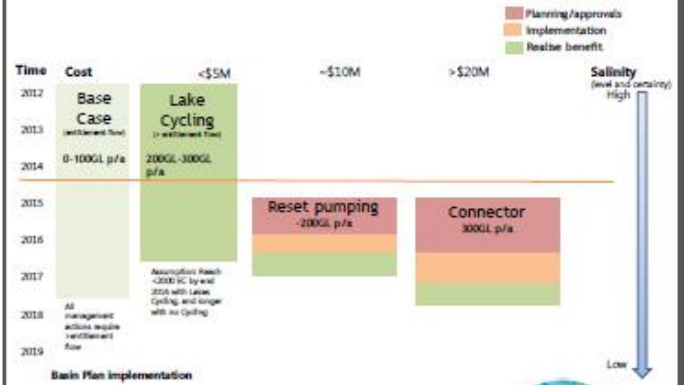
Base Case
5000EC / 400EC
2008 winds
Low flow, med evaporation



Indicative alignments only



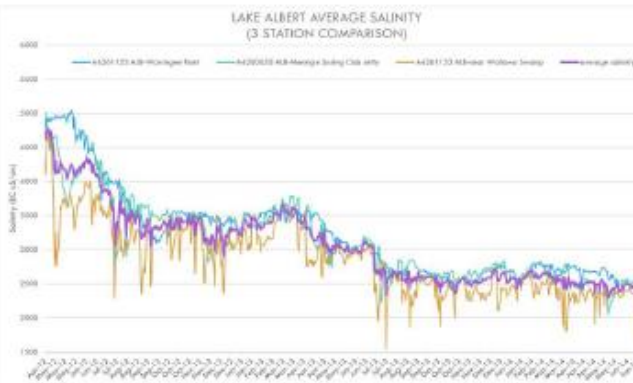
- Benefit Cost Ratio = 0.3 to 0.41
- 'Breakeven' requires the irrigated area to be between 5,179 Ha and 5,607 Ha
- Current area = 400 Ha
- Historic peak = 2,801 Ha in 2003
- Otherwise, the environmental, social and cultural benefits would need to equate to \$13.12 m to \$15.12 m in addition to irrigation increasing to 1980 Ha or 1320 Ha respectively.

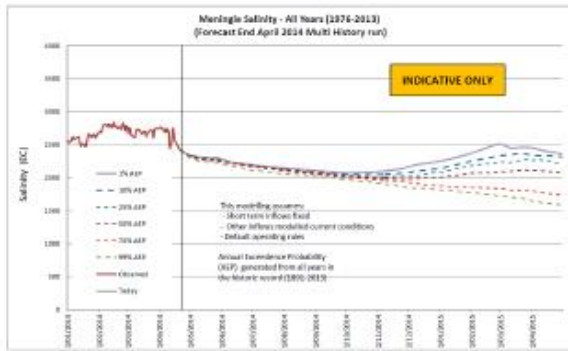


- If the project started in 2014, outcomes would not be realised any sooner than Lakes Cycling.
- Therefore, the Connector would not provide immediate water quality benefits.
- The Connector will not be progressed at this stage.
- The Connector could ensure quick recovery following periods of low flow in the future > Temporary Reset Pumping.

Temporary Reset Pumping

- Quick water quality recovery post drought
- Could provide assurance that if the Basin Plan does not maintain water levels, Lake Albert water quality will recover more quickly than experienced during the recent drought.
- Recommended to be further investigated as a policy option



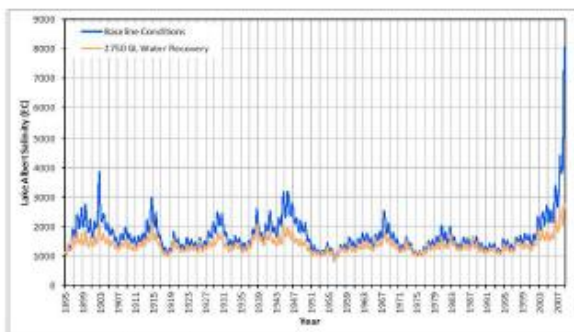


The 99% AEP salinity forecast means that in 99% of years, salinity would be at, or above this range.

Basin Plan

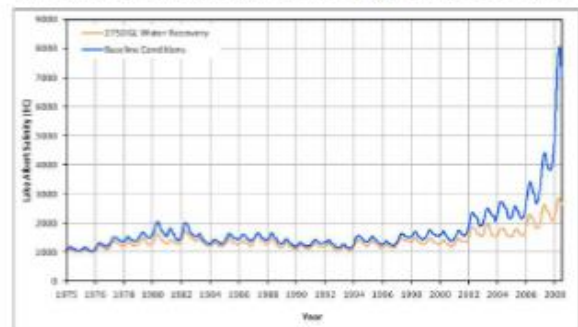
- Lakes to remain above 0 m AHD for the foreseeable future
- Unlikely to experience the same result if there was a repeat of 2008/09 hydrological conditions

Baseline vs Basin Plan 2750 GL/yr (1895/96-2008/09)



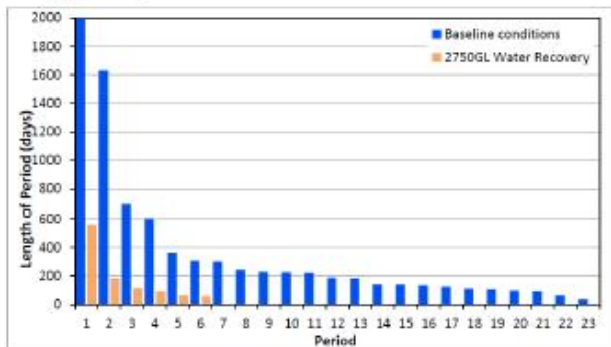
Source: Heneker and Higham (2012)

Baseline vs Basin Plan 2750 GL/yr (1975-2008/09)



Source: Heneker and Higham (2012)

Length of periods >2000 EC baseline vs Basin Plan



Source: Heneker and Higham (2012)

Options Paper findings

- Lakes Cycling is a technically feasible and low cost option to reduce salinity in Lake Albert.
- The Coorong Connector is technically feasible in reducing salinity in Lake Albert as suggested by the modelling and pre-feasibility engineering study. However, the costs substantially outweigh the benefits (the benefit-cost ratio is 0.3-0.41).
- Due to approvals, procurement and construction timeframes, Lake Albert is likely to return to its historic salinity range under Lakes Cycling by the time a Connector could be operational.
- Modelling shows that, under the Basin Plan, Lake Albert water levels will remain above 0.0 m AHD for the foreseeable future, and the frequency and duration of high salinity events will be significantly reduced.
- A Temporary Reset Pumping option was also found to be technically feasible but would need further investigation. This option involves pumping high salinity water from Lake Albert to the Coorong at the end of a drought sequence before River Murray inflows return to Lake Albert.

Project Outcomes

1. Lakes Cycling be continued and augmented to manage salinity in Lake Albert.
2. If the Government decides to pursue a Coorong Connector, further investigations, approvals and funding are required to understand any impacts on the Coorong.
3. The Temporary Reset Pumping should be investigated as a policy option as an emergency action should the Basin Plan not maintain Lake Albert salinity levels.

