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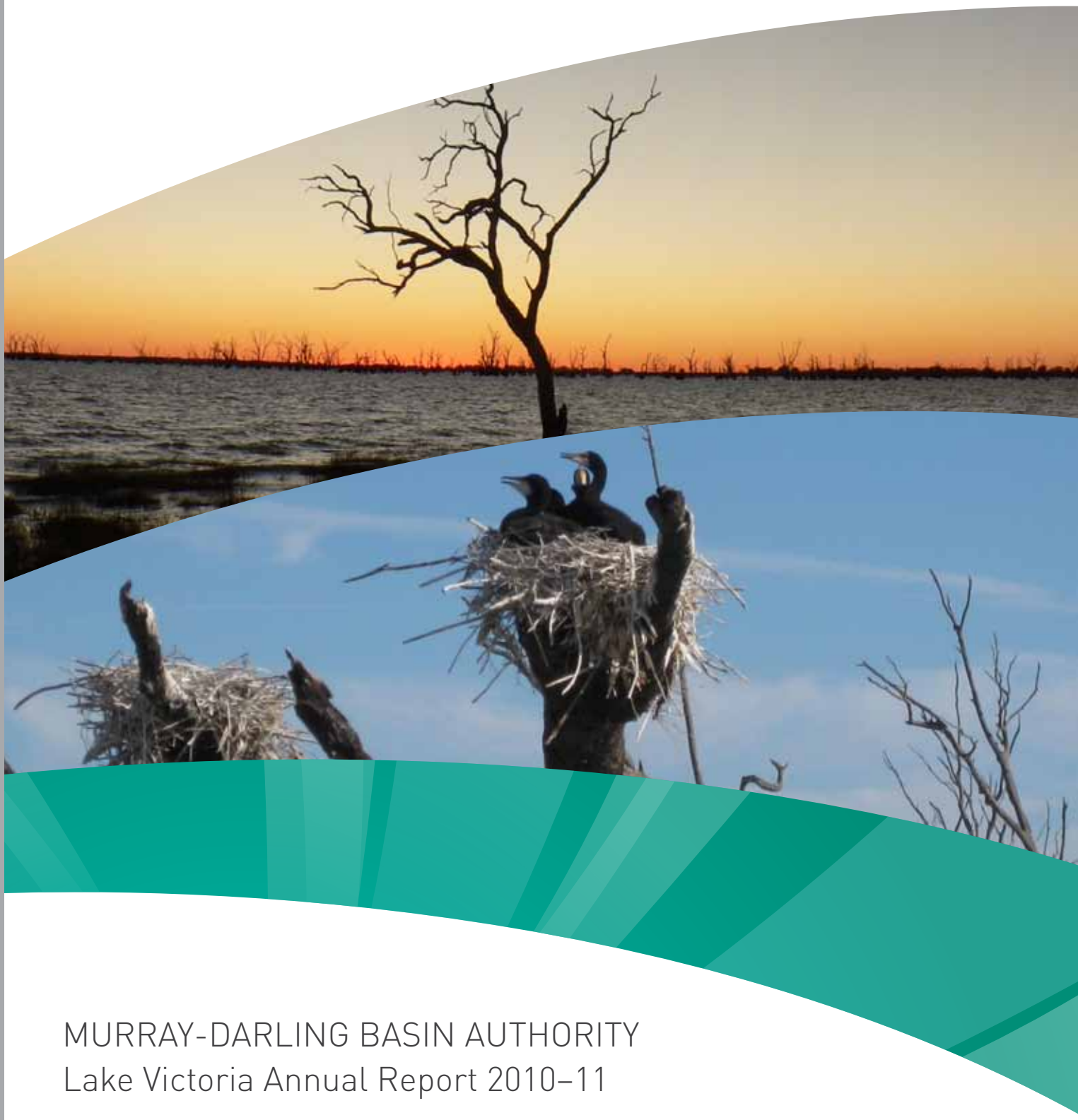
MURRAY–DARLING BASIN AUTHORITY



MURRAY-DARLING BASIN AUTHORITY
Lake Victoria Annual Report 2010–11

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Cover Images: (top) courtesy of Hugo Bowman; (bottom) courtesy of the SA Water Cultural Heritage Management team

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ABOUT THIS REPORT

Lake Victoria is a naturally occurring shallow freshwater lake approximately 60 kilometres downstream of the Murray-Darling Junction in south-western New South Wales, close to the South Australian and Victorian borders. Since 1928, Lake Victoria has been operated by the Murray–Darling Basin Authority (MDBA) as a regulated, off-river storage as part of the River Murray System, and plays an extremely important role in water supply regulation. Lake Victoria is owned and operated by the South Australia Water Corporation (SA Water), on behalf of a joint venture comprising the Australian, New South Wales, Victorian and South Australian Governments. SA Water's program of works is funded and directed by the MDBA on behalf of the four asset controlling governments.

Regulation of the Lake over the last 70 years has contributed to the erosion and exposure of Aboriginal cultural material on the lakeshore and surrounding cliffs, in particular Aboriginal burial grounds. Since 1994 substantial works have been built to protect all known burials from wave and wind erosion, and an Environmental Impact Statement (EIS) was prepared to support an application under Section 90 of the National Parks and Wildlife Act 1974 (NSW) to allow continued disturbance of non-burial Aboriginal objects by regulation of the Lake.

The following annual report focuses on those activities that have been carried out to ensure compliance with each of the Conditions contained in the Section 90 consent. Satisfactory completion, partial completion and non-compliance with the Conditions of Consent have been reported via use of ticks and crosses in the compliance tables. A tick and cross together indicates partial compliance.

The annual report contains excerpts of several different reports published on the work undertaken on Lake Victoria during the reporting period. These excerpts contain summary tables only, and relate directly to how these monitoring activities address requirements of the Section 90 Consent.

Further information on any of these reports will be provided upon request.

FOREWORD

As Chairperson of the Lake Victoria Advisory Committee (LVAC) I am pleased to submit the Annual Report for the period 30 June 2010 to 30 June 2011.

Many of the issues nominated by key stakeholders and specialist advisors as crucial to cultural heritage management at Lake Victoria are now being realised. The model partnership, which includes the Murray—Darling Basin Authority (MDBA), the South Australian Water Corporation (SA Water), New South Wales Office of Water (NOW), NSW Office of Environment and Heritage (OEH), the Barkindji Maraura Elders Council (BMEC) and local land owners, has been pivotal in the achievement of these positive outcomes.

The Scientific Review Panel (SRP) has become an integral component in increasing knowledge of impacts on natural and cultural heritage and guiding the cultural heritage and environmental landscape management. The panel's achievements include the development and implementation trials of the structured monitoring program to record relevant data and place measures on impacts to cultural heritage. The structured monitoring process is particularly convenient for the traditional owners. It provides information on located cultural heritage items and transect monitoring of vegetation and erosion to assist in remediation or protection works.

Fortunately the high rainfall and the increased water flows in the River Murray system have allowed more fluctuated water levels in the Lake. This has supported the vegetation growth and strengthened the burial protection works.

The Aboriginal Cultural Information Database (A.C.I.D) has been developed through SA Water and the Scientific Review Panel working with OEH. It forms an important repository for the collected cultural heritage information from the monitoring activities including historical data. This information forms a solid basis for remediation decisions, and understanding of environmental processes and likely impacts on cultural heritage in and around the Lake. The Lake Victoria Advisory Committee had lengthy considerations about the need for a database. We also looked at its practicality for storing information, and accessibility for the Barkindji and Maraura members.

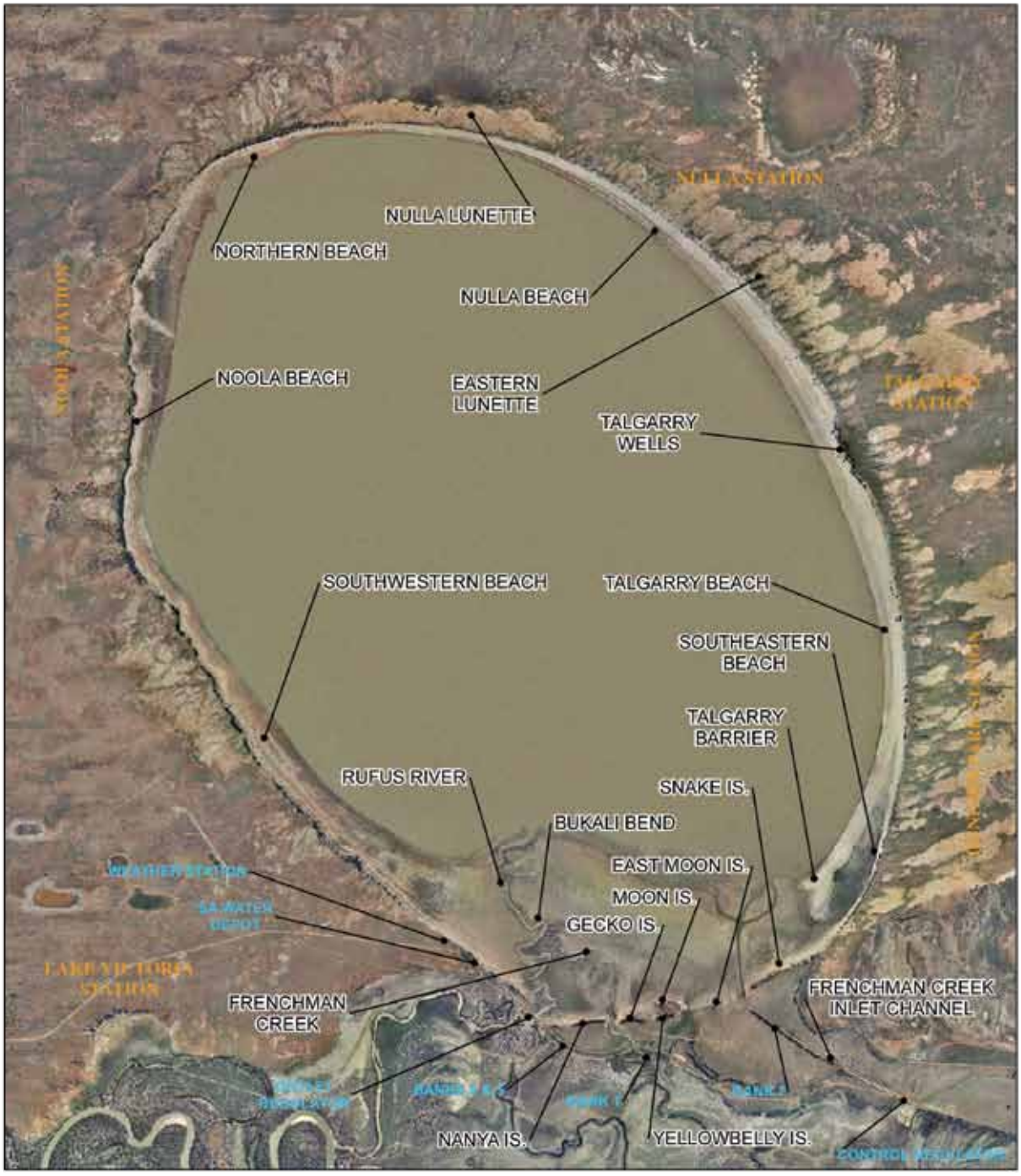
The Lake Victoria Advisory Committee is very supportive of the continued opportunities for the BMEC members to further research their language and cultural heritage as well as exposure to other Aboriginal & Torres Strait Islander cultural heritage events and environmental protection activities. The Lake Victoria community relations and communications strategy places high emphasis on promoting information on the importance of the Lake operations and the cultural heritage values of the lake and the responsibilities of the Barkindji and Maraura people to cultural heritage management.

The Barkindji and Maraura Aboriginal Keeping Place and the camping site plans have been approved and development works are due to begin. These significant places will provide the traditional owners an appropriate opportunity to engage with visitors, deliver cross cultural awareness information on their culture and ongoing cultural association to Lake Victoria.

The Lake Victoria Advisory Committee's enduring partnership reflects cooperation and positive working relationships. It is testament to the Murray—Darling Basin Authority values of inclusiveness, commitment, respect and honesty, flexibility, practicability, mutual obligation and courage.

Tommy Smith
Chairperson
Lake Victoria Advisory Committee

LAKE VICTORIA STORAGE
CULTURAL HERITAGE
COMMON PLACE NAMES



PROJECTION - UTM
DATUM - GDA94

SCALE 1:75,000

STATEMENT OF THE STATUS OF CULTURAL HERITAGE AT LAKE VICTORIA

Reporting period 2010–11

The protection of cultural heritage on the lakeshore and cliffed areas of Lake Victoria is based on a strategy involving ongoing surveillance, and implementation of a cultural heritage protection works program targeting the protection of burial sites as a priority. Cultural heritage protection also involves implementation of the Lake Victoria Operating Strategy (LVOS), which has been designed to encourage the re-establishment of native vegetation, and to reduce impacts to sensitive areas where 'in situ' cultural heritage is located.

In the 2010–11 year, favourable hydrological conditions throughout the Murray—Darling Basin allowed the Murray—Darling Basin Authority (MDBA) opportunity to deviate normal operations within the rules of the LVOS. This involved minimising the time the lake was held full over the warmer months to provide favourable conditions for shoreline vegetation. It also allowed for a degree of flexibility so that operations were able to avoid holding the lake for a prolonged period between the elevations of 24-3-24.7 AHD, where a historically undisturbed sediment 'scarp' is evident, and below >24.5 AHD where less vegetation exists and therefore cultural sites are more exposed and at risk.

As a result of altered operations, cultural heritage in sensitive zones around the lake was offered additional protection from the impacts of waves, especially at times of high energy wind events. This outcome has been particularly satisfying in a year of increased frequency of high energy wind events. In addition, important shoreline stabilising species, especially spiny sedge (*Cyperus gymnocaulus*) and common reed (*Phragmites australis*) have increased in biomass within the Consent area, and of particular note, along the Talgarry Barrier. This pattern of regrowth also occurred in April 2006 after the late 2005 flood reached 27 m AHD and offers improved ecological outcomes, which are of immense cultural value to Aboriginal people.

Lyn Barnes
Lake Victoria Program Manager

Grinding stone
Courtesy of Lyn Barnes

SNAPSHOT VIEW OF THE 2010–11 REPORTING PERIOD

Burial protection works

- The total number of burial sites now recorded at Lake Victoria is 255. This figure aligns within both the Lake Victoria and Office of Environment and Heritage (OEH) databases, and all sites have been ground truthed.
- Within the 2010–11 year, newly discovered burial locations consisted of:
  - Ten along the Nulla shoreline
  - One on Snake Island
  - Five along the South Eastern Beach.
- The burial protection works program was limited due to fluctuating lake levels throughout the reporting period.

Monitoring for cultural heritage

- Dr Colin Pardoeand Dr Jane Lennon progressed development of the new cultural heritage 'structured cultural heritage monitoring program'. This involved field trips with participation by Barkindji Maraura Elder Council (BMEC) members.
- The SA Water cultural heritage management team undertook cultural heritage shoreline monitoring inspections on seven occasions throughout the period.
- Monitoring activities were restricted due to fluctuating lake levels and wetter than normal conditions.
- Monitoring of gully erosion caused by high rainfall events in March have been undertaken and all sites found were GPS recorded, with temporary protection works put into place.

Aboriginal Cultural Information Database (A.C.I.D)

- The BMEC provided permission for a collaborative effort to occur between SA Water and OEH so that the Lake Victoria and Aboriginal Heritage Information Management System (A.H.I.M.S) datasets could be cross matched and aligned.
- Lake Victoria has now been divided into new site card areas, which have been identified as landform polygon shape files. New site cards will need to be created for new burial and scar tree sites only in the future.

Lake Victoria Advisory Committee and relations Aboriginal Involvement at Lake Victoria

- Within the 2010–11 reporting period, three Lake Victoria Advisory Committee (LVAC) meetings were convened.
- Five BMEC meetings were held throughout the year, with up to 20 members attending to consider and formulate advice to be provided to LVAC.
- Numerous cultural heritage monitoring field trips were undertaken by BMEC members throughout the period.
- Landholders, who have managed adjoining properties over many years, continue to provide valuable advice to the MDBA at LVAC, via participation at field trips and the provision of feedback about various reports.

Employment of Aboriginal workers at Lake Victoria

- The MDBA and SA Water continue to support the Aboriginal trainee program. This entails a commitment to the employment of two Aboriginal trainees at any one time.
- In addition, the Cultural Heritage Supervisor, the Cultural Heritage Field Officer and BMEC Facilitator positions continue to be supported as 'Aboriginal identified positions'.

The Lake Victoria Cultural Landscape Plan of Management Reporting

- Existing Lake Victoria Protocols (1, 2, 3, 4 and 7) were reviewed in consultation with LVAC stakeholders as appropriate for a document that is designed to be iterative.
- In addition, a new Protocol (8) is being developed to provide further guidance about agreed procedures involving request for service from BMEC members.
- Additional 'works procedures' have been developed and will be added to the Plan of Management once approved by the BMEC and LVAC.

Revegetation

- Wetter than normal conditions allowed for altered lake operations to specifically assist vegetation outcomes. As a result, there has been an impressive recruitment response of spiny sedge (*Cyperus gymnocaulus*) and common reed (*Phragmites australis*) in particular.

Research activities and the Scientific Review Panel

- Members of the Scientific Review Panel (SRP), Mr David Tongway and Dr Jane Roberts undertook field research to inform redesign of the scientific monitoring program. As a result the following reports were provided for MDBA consideration:
  1. *'Working with Clumps of Spiny Sedge (Cyperus gymnocaulus) at Lake Victoria'* by Dr Jane Roberts.
  2. *'Landscape Function Analysis at Lake Victoria'* by David.J.Tongway.
- The SRP advised the River Murray Water operations unit about adjustments to the 'Operating Strategy' to support vegetation establishment and to prevent wave impacts to sensitive areas of the foreshore.
- A straw bale trial was initiated on the Eastern foreshore in an attempt to reduce impacts to 'historically undisturbed sediments'.
- A new burial protection trial was initiated using natural materials such as 'hop bush'.

Scientific monitoring

- Annual sediment movement monitoring by Dr David Kennedy and Dr Wayne Stephenson of the University of Melbourne revealed no significant shoreline change within the reporting period.
- Annual vegetation monitoring by Dr Ian Sluiter of Ogyris Pty Ltd revealed a significant increase in biomass and vegetation cover, and importantly, in culturally sensitive sites such as the Talgarry Barrier.

Land management

- Land management activities focused on rabbit controls and the treatment of a weed commonly known as horehound (*Marrubium vulgare*).

Lake operations

- The operation of Lake Victoria within this period demonstrated how management can provide for a balance between the competing needs of water supply, cultural heritage protection and environmental requirements. Lake operations were adjusted to sympathetically manage for the foreshore environment of Lake Victoria.

Impacts outside of the Lake

The MDBA continues to work towards reaching an enduring agreement with neighbouring landholders who have been affected by lake operations.

LAKE VICTORIA ADVISORY COMMITTEE AND COMMUNITY RELATIONS

(Consent Conditions 1-11)

	Compliance Response ✓
Lake Victoria Advisory Committee (LVAC) (Consent Conditions 1–11)	• Within the 2010–2011 reporting period, three LVAC meetings were convened in August and November 2010 (Meetings 59 and 60), and April 2011 (Meeting 61). • Minutes of the LVAC and Lake Victoria Working Group (LVWG) meetings were distributed to stakeholders in a timely manner. • The Lake Victoria Program Manager provides members of the LVAC with a summary of MDBA actions undertaken to comply with the S90 consent conditions at every meeting. • Landholders who have managed adjoining properties over many years continue to provide valuable advice to the MDBA via the following means: – as members of LVAC – to the Scientific Review Panel via: 1. Participation in field trips. Messrs Warren and Stuart Duncan provided local insights into shoreline change and processes at work, especially along the Eastern foreshore when the SRP visited the site in May. 2. Provision of feedback in relation to the annual scientific monitoring reports. • Landholders also continue to liaise cooperatively with the MDBA, SA Water and the NSW Office of Water (NOW) by providing access approvals to their properties to allow for land management activities to be undertaken such as feral and weed control programs. In recognition of the partnership approach, NOW and SA Water have treated an outbreak of spiny emex (*Emex australis*) on access tracks through Talgarry and Dunedin Park. • Landholders are also advised and involved if an activity may cause impacts to their lands, such as the 2010 Dam Safety Improvement Program. • The 'Duncan family' of 'Talgarry' and 'Dunedin Park' Stations have also continued to provide permission for SA Water to utilise a quarry pit on their lands, thereby allowing for the continued maintenance of the Lake Victoria levy structures. • LVAC member and SA Water representative, Mr Jim Rishworth (Manager River Murray Operations) left the position in August. He was thanked by the LVAC Chairperson for his contribution to the SA Water organisational charter, of a 'values statement' which included a commitment to respect Aboriginal people. • Mr Brenton Erdmann was welcomed by LVAC in November, as the Manager River Murray Operations (SA Water). • OEH provided a briefing to the LVAC (60) and to the LVWG on the extensive changes to the NSW National Parks & Wildlife Act. (NSW NPW Act) The briefing provided information to stakeholders about the new 'due diligence' guidelines, and that the amendment allows for a possible change to the Lake Victoria consent if required.

A traditional cook up by the cultural heritage supervisor.
Courtesy of Lyn Barnes

Landholder, Mr Stuart Duncan discusses matters with Acting Cultural Heritage Supervisor, Mr John Grima.
Courtesy of Lyn Barnes

	Compliance Response ✓
BMEC meetings and BMEC involvement at Lake Victoria. (Consent Conditions 1–11)	• Five BMEC meetings were held throughout the year in August, November and December 2010, and in February and April 2011. • The BMEC continues to offer expert advice to the LVAC on matters related to the protection of Aboriginal cultural heritage. Advice is provided by up to 20 members who attend BMEC meetings, and up to two members per day on field monitoring activities. A representative group of 14 members attend LVAC with nominated proxy members attending when members are not available. • Advice provided to the LVAC and MDBA within the 2010–11 reporting period included the following: – Design of the 'Keeping Place' to ensure the design was appropriate for BMEC needs (LVAC 59 & 61). – The selection processes for appointment of the Cultural Heritage Supervisor and trainee position. – Traditional Aboriginal lore and how it should be used to guide the process for protection of 'traditional burials' (LVAC 60). – The records management system should allow for delineation of different types of burials (LVAC 60). – Information about traditional methods for the protection of burials. – An Aboriginal community sub-committee has been formed to organise and run the Rufus River Memorial Day. Agencies and community groups will be asked to contribute. – Lake Victoria Protocols should be altered to enable them to be easier to understand. Flow charts were developed in response to this request (refer to the Plan of Management section). • The BMEC were engaged to provide their advice when the following activities were undertaken: – Nanya and Snake Island cultural heritage monitoring (July). – Monitoring from Frenchmans Creek to the Talgarry fence line (August). – Survey of Nulla beach and the 'HUS' along the Eastern foreshore, including consideration of a proposal to place logs made of coconut fibre along the foot of the 'HUS' to protect it (August). – Cultural monitoring the transect known as PS 28 (August). – Inspection of repair works to sections of the Snake Island wave break (August). – Cultural heritage monitoring of the high reaches of erosion gullies along the western side of the Lake (November). – Inspection of new burial protection method trialled at Talgarry cliffs (March). – Scaddings Bridge excavation works (March). – Cultural heritage impact assessments involving the Dam Safety Improvements Program as undertaken by SKM Pty Ltd. – Burial protection works in erosion gullies on Noola and Nulla in April 2011. – BMEC members accompanied Dr Jane Lennon (LVAC Deputy Chairperson/ member of SRP) and Dr Colin Pardoe (archaeologist/member of SRP) to the site when developing the cultural heritage 'structured monitoring program' (May).

Acting Cultural Heritage Supervisor, Mr John Grima and BMEC Elder, Cora Lawson.
Courtesy of the Lake Victoria Cultural Heritage Management team

BMEC members May Johnson and Brian Carter collecting traditional foods from within the Lake Victoria region.
Courtesy of Lyn Barnes

BMEC Elders monitoring Talgarry burials.
Courtesy of the Lake Victoria Cultural Heritage Management team

	Compliance Response ✓
BMEC meetings and BMEC involvement at Lake Victoria. (Consent Conditions 1–11) *(continued)*  **Stone objects exposed at low lake levels.** Courtesy of Lyn Barnes	– Members were video interviewed by Mia Thurgate of Associative Producers Pty Ltd (Month) in May 2011 as part of the 'Lake Victoria Oral History and Video Project' so that "true stories can be used to educate the public" (Christine Kelly, BMEC Elder, LVAC 60). – Monthly site visits were undertaken on one occasion only throughout the year due to higher than normal Lake operating levels throughout Summer and Autumn 2011. • Fifteen members of the BMEC undertook 'white card' training in December 2011 to fulfil Occupational Health and Safety obligations required to participate in site visits. • The MDBA continues to provide resources to support the BMEC as per Consent Condition 1. These resources are utilised for BMEC meetings including, the payment of fees for service and to underwrite the BMEC Chairperson and BMEC Facilitator positions. • In the 2010–2011 reporting period, the MDBA provided $53,845.60 for the payment of fees for service and travel expenses. This figure does not include funding provided for catering and facility hire for the five meetings. • In addition, funding support for the BMEC Facilitator position totalled $79,315 (ex GST).
Lake Victoria Working Group meetings (Consent Condition 2)	• The Lake Victoria Working Group (LVWG) met in July, August and November 2010, and in April 2011. • Additional planning meetings were also held on five other occasions throughout the year to progress implementation of the Lake Victoria works program (June, July x 2, October and March).
Employment of Aboriginal workers at the Lake (Consent Conditions 1,8 & 9)  **Aboriginal trainee Gilbert Abdulla at work at Lake Victoria.** Courtesy of the SA Water Cultural Heritage Management team  **Wade Stiriford with John Grima undertaking works in the S/E corner of Lake Victoria.** Courtesy of the SA Water Cultural Heritage Management team	• Mr Greg Warren was employed as the Lake Victoria Cultural Heritage Supervisor in February 2011, however the position was vacated in May. A new selection process will be undertaken as soon as possible, and when the BMEC are available to participate in the recruitment process. • Mr Colin Thorne was appointed as the BMEC Facilitator in February 2011, however this position was vacated in early May. • Funding support for the Facilitator position was confirmed by NOW and the MDBA in July 2011 however advertising for the position was delayed until post NSW State elections. • The MDBA and SA Water continue to support the Aboriginal trainee program. This means, there is a commitment to the employment of, at any one time, two Aboriginal trainees. The trainees are provided an opportunity to gain a Level 3 certification in 'Conservation and Land Management' with TAFE. Trainees also receive experience and qualification in the use and operation of heavy plant equipment, and in works related to the water management industry. The aim of the program is to provide Aboriginal youth with the necessary skills and qualifications to be able to gain meaningful work within the wider community. • The trainee program has proven successful, with Wade Stiriford successfully completing his qualifications, and being retained for a further 12 month period at Lake Victoria. Wade has proven to be an invaluable and keen employee, who has worked closely with other team members to implement the works program. Well done Wade.

	Compliance Response ✓
Employment of Aboriginal workers at the Lake (Consent Conditions 1,8 & 9) *(continued)*	• Advertising for two new trainees was undertaken in November 2010, with seventeen applications received. Gilbert Abdulla was appointed in January 2011 however vacated the position in early July. The position will be filled when the BMEC are available to participate in the recruitment process.
Sharing of information with the broader community (Consent Condition 10)  **The Lake Victoria Information Bay.** Courtesy of Digby Jacobs	• In November 2010, members of the MDBA graduate program visited Lake Victoria and were provided information about the cultural heritage management program and Lake Operations from members of the BMEC and SA Water staff. • In November, six BMEC members participated in the National Indigenous Land and Sea Management Conference at Broken Hill. • Progress towards the establishment of the Lake Victoria Aboriginal Cultural Information Database website (A.C.I.D) for use by the BMEC at the 'Keeping Place' was undertaken. The website will allow the BMEC to share information as they please with the wider Aboriginal community. • The MDBA and SA Water are considering an extension of the 'Communications Strategy', which will involve a strengthening of ties with local schools. The aim of the program will be to share the story of Lake Victoria with high school children, and to increase the pride of Aboriginal children, especially of Barkindji and Maraura children, in their culture and heritage. It is envisioned that a stronger connection to the schools programs will also help to encourage local Aboriginal year 10 students to apply for any vacant Lake Victoria Aboriginal positions (refer also to Communications and Access Strategy below). • The 'Lake Victoria – A Special Place' brochure is in the process of being updated and copies will be placed at the Lake Victoria Information Bay when completed. • A project to capture the stories of the BMEC members and landholders has been started (refer to previous section).
BMEC involvement in activities outside of the consent area, which compliment requirements of the Lake Victoria Cultural Landscape Plan of Management (LVCLPoM). Consent Conditions (1,7, 8 ,9 & 10)  **BMEC Elder, Mr Ray Lawson monitoring fire breaks.** Courtesy of Steven McGlashan	• The MDBA and NOW provided assistance to the BMEC via utilisation of NOW staff resources within the establishment phase of the 'Barkindji Maraura Environment and Education Trust' that was established in 2011. The Trust was set up to provide additional training and employment opportunities for Aboriginal youth in natural resource management via the formation of partnerships outside of the scope of the Lake Victoria project. The Barkindji Maraura Environment and Education Trust initiative provides opportunity to provide positive linkages with the Lake Victoria Indigenous Employment and Training Strategy, in the longer term. • The NOW consulted with the BMEC and wider Aboriginal community in 2011 regarding an application for an Aboriginal Heritage Impact Permit with OEH, to allow for a conservation reserve fence to be constructed on Nulla Station in compliance with the NSW NPW Act. The fence when constructed will restrict access to the sensitive Nulla lunette and foreshore. • BMEC members were also involved in the following cultural heritage monitoring activities associated with the Lake Victoria project: – assessment of erosion gullies and associated erosion control works and repairs to access tracks.

	Compliance Response ✓
BMEC involvement in activities outside of the consent area, which compliment requirements of the Lake Victoria Cultural Landscape Plan of Management (LVCLPoM). Consent Conditions (1,7, 8 ,9 & 10) *(continued)*	– campground site works (March). – removal of tree stumps at the depot (September and April). – digging of effluent pits at Lake Victoria village (April). – digging of holes for planting trees/shrubs between the Information Bay and the SA Water depot (April). – clearing fire breaks on properties owned by NOW on behalf of the MDBA (September and October). • Survey of a gravel pit to allow for levy maintenance works to continue (October). • Partnership management between the BMEC, MDBA, SA Water and NOW have progressed the 'Meeting Place/Campground' project on the foreshore of Noola Station, in the north-western quarter of the Lake environs. This facility when completed will be utilised by the BMEC to quietly enjoy this special and culturally significant Aboriginal landscape. The facility will feature a kitchen, storage and campfire areas, and an environmentally friendly collection well technology ablution facility. • The development of two 'Memorandum of Understanding' (MOU) agreements between the BMEC, MDBA, NOW and SA Water will formalise agreements about 'use' and 'management' of the 'campground' facility. A draft has been developed and is subject to consultation and verification of insurance arrangements.

Some erosion control works in gullies leading to the Nulla foreshore.
Courtesy of Lyn Barnes

Talgarry Barrier in the distance.
Courtesy of SA Water Cultural Heritage Management team

CULTURAL LANDSCAPE PLAN OF MANAGEMENT

(Consent Conditions 12-37)

	Compliance Response ✓
Lake Victoria Cultural Landscape plan of Management (LVCLPoM) (Consent Conditions 12-17)  **A temporary burial protection method on the Nulla foreshore.** Courtesy of the SA Water Cultural Heritage Management team	• Existing Protocols (1, 2, 3, 4 and 7) were reviewed in consultation with LVAC stakeholders, in response to a BMEC request for clarification and simplification of the current versions (Meeting 59). Review from time to time is also appropriate because of the iterative nature of the Plan of Management. • In response to the BMEC request, flow charts were also developed and taken to the BMEC for consideration in April. • A new Protocol (8) is being developed to provide further guidance to stakeholders about agreed procedures involving request for service from BMEC members, and as guided by the Consent requirements. • The updated LVCLPoM will be reprinted when the consultation process as outlined above has been completed so the new Protocol versions can be included. • A trial method of protecting burials using traditional techniques has been recorded and added to the 'Burial Mound Construction and Maintenance Procedure' within the Plan of Management.
Reporting processes (cc18-19)	• The draft Lake Victoria Annual Report (2009-2010) was provided to stakeholders for consideration two weeks prior to the final LVAC meeting (LVAC 60) in 2010 as required under procedure outlined within the LVCLPoM. • The Lake Victoria Program Manager received feedback from four members of the LVAC and from SRP members. This feedback was considered and incorporated into the final version of the report. • The 2009-2010 annual report was then provided to the Director General of OEH on the 28th of February 2011, in compliance with Consent Condition 18. • The final report was also placed onto the MDBA website, and a presentation was provided to LVAC (61).
Communication and access (cc 20)  **Mr George Gates inspecting a section of a grinding dish on the Nulla foreshore.** Courtesy of Digby Jacobs	• Overseas exchange students and staff from SuniTafe visited the greenhouse and the information bay in October. They were provided a briefing by the Aboriginal Cultural Heritage Field Officer. • The Lake Victoria Program Manager also provided a briefing about Lake Victoria to students and teachers from the Boort Secondary College (April). • In May, SA Water and NOW staff accompanied Mr George Gates, Director of Water Management Implementation (NOW) on a tour of the northern foreshore of Lake Victoria, and explained the cultural heritage and works management program. • Updating the 'Access Protocol' (Protocol 1) as contained within the LVCLPoM began, with feedback provided by SA Water as the first step to ensure amendments are practical. The next step will be for the BMEC to provide their input, followed by the LVWG and then the LVAC (refer also to Consent Condition 12-17 above). • Public access controls to the Noola foreshore will be strengthened via the placement of signs containing information about responsible use of the site when campground construction begins. • The Information Bay continues to be utilised by large numbers of visitors. • Refer also to actions achieved regarding Consent Condition 10.

	Compliance Response ✓
Strategies for revegetation (cc 21)  **Spiny Sedge regrowth.** Courtesy of Jane Roberts  **Monitoring 'spiny sedge' clumps on the Talgarry Barrier.** Courtesy of Jane Roberts  **David Tongway and Hugo Bowman undertaking Landscape Function Analysis.** Courtesy of the SA Water Cultural Heritage Management Team	• A record number of high rainfall events occurred in late 2010 – early 2011 allowing the MDBA enough flexibility to be able to reduce lake levels over summer and autumn specifically to assist vegetation outcomes. Please refer also to the section on 'Lake operations' (Consent Conditions 38-41). • As a result of altered operations, there has been an impressive recruitment response of spiny sedge (Cyperus gymnocaulus) in particular, especially along 'strand lines' and near established mature plants and of greatly increased plant cover and biomass on the Talgarry Barrier, comprising of primarily spiny sedge and common reed (Phragmites australis). • The expansion of spiny sedge is important because of its ability to withstand prolonged periods of both inundation and exposure (Carlile 2010), and because of its ability to stabilise (see below). Cited by Bowman (8) in report below (Details added in end of report). • The recruitment response of vegetation, and in particular the spiny sedge was scientifically studied by Dr Jane Roberts (Riverine Ecologist) and David Tongway (Landscape Function Analyst) who are both members of the SRP. Dr Roberts and Mr Tongway provided their findings to the MDBA in the following two reports: 1. *'Working with Clumps of Spiny Sedge (Cyperus gymnocaulus) at Lake Victoria'* by Dr Jane Roberts. 2. *'Landscape Function Analysis at Lake Victoria'* by David.J.Tongway. • The report by Dr Roberts identified growth stages and other characteristics of spiny sedge to be used to describe 'clump population structure'. This information will compliment 'plant abundance' and 'species composition' data already collected. • Mr Tongway's report provided advice about how well the Lake Victoria shoreline functions as a 'biophysical' system, and it's capability therefore to be able to ameliorate the effects of wind in moving sandy materials which might expose cultural sites. Mr Tongway developed an 'index' to assess the ability of spiny sedge to provide 'services' for erosion control, based upon size, spacing and canopy density. • Another report titled, 'Observations of outcomes of the targeted operation of Lake Victoria for the benefit of foreshore vegetation in 2010 -11, and recommendations for the 2011-12 year' was produced by Mr Hugo Bowman of the MDBA in July 2011. • Advice about the best native plants to use, correct location for planting (especially in relation to stabilisation), and about nursery operations will be provided by Mr Dylan Ostler, who is expected to visit site later in the year. Mr Ostler is a plant and propagation specialist. • Revegetation trials established within the previous reporting period along the South/Eastern beach at around 27 m AHD, and in the cliffed areas, are proving successful, with most plants surviving to date. • Another 1,600 plants were planted between November and April, with plots extended on Snake Island and at 'Duncan's corner'. • SA Water staff collected 'Hakea' seeds locally, propagated them in the nursery, and then planted the young plants in the cemetery sites.

	Compliance Response ✓
Research activities (cc 22)  **SRP field trip in front of the hay bale trial with the eroding HUS seen behind.** Photo courtesy of Lyn Barnes  **Placement of a 'cow bone' with Wade Stiriford GPS recording the site and SRP members Dr Colin Pardoeand Dr Jane Lennon overseeing.** Photo courtesy of Lyn Barnes	• A new burial protection method using natural resources has been trialled. Natural materials such as 'hop bush' branches can be used to create a net, which is then secured to exposed roots to stop water from eroding a site, and to trap sediments. • Another trial has been undertaken along a 'scarp' of eroding 'HUS' along the Eastern foreshore, with the landform thought to contain 'in situ' cultural material. The trial consisted of the placement of pinned hay bales, covered in geo fabric in five different layouts to ascertain if they will protect the feature from the impacts of waves. Photographs were taken, and follow up monitoring will occur when the lake level drops. • Other trials involving measures to repair gully erosion leading to the foreshore and potentially impacting the works program included: 1. laying hay bales and coconut fibre logs in varying configurations as steps to slow head pressure, to allow water and sediment to drop 2. creating geo fabric 'bags' filled with rock, then covered with fabric and sand to repair access tracks. • On Nanya Island, different ways of configuring and holding down logs made from coconut fibre, to protect the sand nourishment works via enabling the capture of sand drift has been undertaken. • Tagged and numbered cow bones were placed in the field to add an additional dimension to the 'pink brick' trial that was started in the previous reporting period.
Review panel (cc 23-26)  **SRP and landholder discussion.** Courtesy of Lyn Barnes  **SRP discuss gully erosion and exposed old soils on Nulla Station.** Courtesy of Lyn Barnes	• The Lake Victoria Scientific Review Panel (SRP) met on three occasions in July, October and May to progress the review of the Lake Victoria Scientific Monitoring Program. • The SRP meeting held in May included a field trip, including observations of: *Erosion and sediment movement* – Evident beach cusps after rapid draw down from 25.0 to 24.3 m AHD, and caused as a result of patterns emerging from the turbulence of the intersecting, reflecting and refracting waves and currents during high energy wind events. – The removal of considerable volumes of material from parts of the shoreline where less vegetation occurs (>24.5 m AHD) such as the North East Shoreline. – Observations of exposed old soils and deltas caused by gully erosion after heavy rainfall. – The above observations reinforced the importance of sporadic high energy storm events in influencing the shoreline beach morphology and profiles in these typically low energy systems. – Erosion of the Eastern foreshore and of the 'HUS' at elevations of between 24.3-24.7 m AHD. Consideration was given to possible protection methods and the gathering of information from neighbouring landholders who have witnessed the change over time.

	Compliance Response ✓
Review panel (cc 23-26) *(continued)*  **SRP assesses shoreline change.** Photo courtesy of Lyn Barnes	*Vegetation and particularly the recruitment of spiny sedgeLandscape Function Analysis* – A demonstration by Mr David Tongway of the 'Landscape Function Analysis' procedure which involves measurement of the structural arrangement of plants and other interrelated dynamics such as soil dynamics, which together lead to a measure of landscape resilience. • Over the reporting period the MDBA/SRP has developed objectives and project design for a planned 'HUS' mapping study to be conducted by Mr Matt Cupper later in 2011. This study will gather information about a possible relationship between cultural heritage and the 'HUS', including how the 'HUS' may interact with gullies and older soil layers elsewhere. • Dr Colin Pardoeand Dr Jane Lennon progressed development of the new 'structured cultural heritage monitoring program'. Progress included: – Development of the Aboriginal Cultural Information Database (A.C.I.D) as a first step (refer also to CC 29 below). • A complete survey of the shoreline in September to locate cultural objects which are to be included in the structured monitoring program, and to determine new site card areas for placement into OEH, A.H.I.M.S. database. • Dr Wayne Stephenson who is a consultant statistician was engaged by the MDBA to undertake an initial pilot data analysis of the previous ten years dataset to ascertain if a larger data analysis would provide meaningful information. • The River Murray System Operations Review (MDBA) conducted some broad spatial and temporal pattern mapping to look for meaningful patterns and relationships between lake operations and other variables. • A meeting was also held between the SRP and the MDBA operations unit to address some of the uncertainties of the operating strategy. The SRP provided a recommendation to pass lake operations through 'vulnerable' elevations ranges swiftly to reduce the chance of erosion from waves. Specifically, this would involve drawing the lake down below 24.8 m AHD to 24.3 m AHD swiftly, and then refilling quickly to resume the more stable elevation levels of >24.8 m AHD. • The SRP/MDBA requested clarification from OEH about consent requirements as part of the review process.
Development of the Aboriginal Cultural Information database (A.C.I.D) (CC 29)  **A tagged scar tree.** Courtesy of Greg Warren	• The BMEC provided permission for a collaborative effort to occur between SA Water and OEH so that the Lake Victoria and A.H.I.M.S datasets could be cross matched and aligned. This process included: – A site verification process by Mr Daniel Haines (SA Water) and Mick Kelly (OEH). – The grouping of cultural objects into new site card areas, which were GPS identified as landform polygon shape files for placement into the AHIMS and SA Water data systems. – The whole of Lake Victoria will, in the future, be regarded as a one cemetery site, with new individual sites added for burials and scar trees only. Other objects will be recorded within these new and already existing site card areas. – Generic site cards have been developed for use by SA Water. – Electronic photographs will be able to be linked to each site card site, so the status of an object or site can be visibly and easily followed over time.

	Compliance Response ✓
Development of the Aboriginal Cultural Information database (A.C.I.D) (CC 29) *(continued)*	• The A.H.I.M.S database will be placed on a computer in the proposed Lake Victoria 'Keeping Place'. The BMEC if incorporated will be able to link to the ARAM (Aboriginal Regional Assessments Module), to be able to use the facility for wider purposes than management of the Lake Victoria cultural dataset. For example members with access permission will be able to import data from museums, create maps, create statistics and download videos.
Monitoring cultural heritage and monitoring burial protection works (cc 27-29)  **A burial protected via a mix of sand bags and traditional methods.** Courtesy of the SA Water cultural heritage management team  **Protection works on Nanya Island.** Courtesy of the SA Water cultural heritage management team  **Many Aboriginal objects were exposed when the Lake level was held at 23.4 AHD in May.** Courtesy of Digby Jacobs	• The total number of burial sites recorded at Lake Victoria on the 30th of June 2011, was 255. This figure was verified as a result of Mr Daniel Haines (SA Water) and Mr Mick Kelly (OEH) working together as outlined above, and which included ground truthing. • This number of 255 burial sites comprises: – existing protected and recorded burials. – existing protected burials not previously recorded (18). – new burials that have been protected (7). – new burials not yet protected because BMEC advice could not be sought in time before lake level rises (9). – in addition, two burials had previously been recorded twice. • Within the 2010–11 year, newly discovered burial locations consisted of: – Ten along the Nulla shoreline. – One on Snake Island. – Five along the South Eastern Beach. – A number of new burial sites were discovered when the cultural heritage management team surveyed the lower foreshore when the lake was at its lowest level in May. Temporary protection methods were utilised before the lake level rose. • A great number of exposed cultural objects such as stone tools were also revealed along the Nulla shoreline when the lake was held low for a short period of time in May. • The SA Water cultural heritage management team undertook cultural heritage shoreline monitoring inspections on eight occasions throughout the period (July, December, and February x 2, May x 3 and June). • Monitoring and protection activities have been restricted however throughout the year due to fluctuating lake levels. • All burial sites have now been tagged with a small concrete block with an ID tag attached. • SA Water staff member Daniel Haines checked SA Water records and liaised with OEH to ensure no previously recorded cultural sites would be impacted by the Dam Safety Improvement Program. • SA Water purchased a'Getac' GPS unit to be used by staff in the field to accurately record the location of cultural sites. Improved accuracy will allow for cultural heritage data to be fully integrated with other scientific monitoring datasets, and will allow for accurate analysis of data associated with the new 'structured' cultural heritage monitoring program. • GPS recording of cultural heritage site exposed as a result of gully erosion caused by high rainfall events in March has been undertaken. An associated map outlining the gullies was developed and will be used to guide a works program which prioritises protection of the cultural sites found.

UNDERSTANDING, ASSESSING AND MONITORING THE ENVIRONMENT, IMPACTS AND MITIGATION ACTIONS (CONSENT CONDITIONS 27 – 37)

Section 90 Consent and Compliance Response for Erosion Monitoring at Lake Victoria (NPWS 2006)

By Dr Wayne Stephenson (University of Melbourne)

Dr Stephenson's report is available upon request.

The field trip component of this monitoring program was undertaken by Dr David Kennedy in June 2011.

In the 2010–11 reporting period only one monitoring field trip was undertaken. The inter-annual monitoring program, usually undertaken in January or February could not be undertaken due to higher than normal operating levels.

Erosion Monitoring Consent Conditions	Compliance Response ✓
Condition 27: The LVCLPoM will contain strategies for monitoring cultural heritage, the impacts of erosion, deposition, saline groundwater and salinity on the lakeshore, particularly targeting recording the condition, protection and monitoring of known and newly discovered burials, and of any sites identified as being of special significance, according to measures described in detail in the section 87 permit.	Thirty seven transects, some established as early as 1995, are surveyed annually for the purpose of monitoring erosion and protection work performance. The majority of transects are located in areas of high cultural value. In June 2011, 34 of these transects were surveyed and compared against previous surveys to detect if significant erosion had occurred. The more notable results of the survey show that: 1. No *significant* erosion has occurred in the 2010–2011 monitoring period. 2. Some erosion has occurred in historically undisturbed sediments during the 2010–11 monitoring period but not at rates considered significant. 3. Erosion was noted on profiles 28PS, 25PS, KTW, KTN, 25PS, KNU, 13PS, and 9PS. 4. It is recommended that surveys of cultural material on the above profiles should be undertaken to determine if any material is being threatened or damaged. 5. Overall profiles continue to show a mixed response to the lake operating regime and wind/wave environment, as noted in previous years.

Monitoring shoreline change – June 2011.
Courtesy of Dr David Kennedy

Erosion Monitoring Consent Conditions	Compliance Response ✓
Condition 28: Where works have been constructed for the purpose of protecting burials and other significant objects and sites from physical impact, a monitoring and maintenance program will be established, and this will be included in the LVCLPoM.  **Monitoring burial protection works - June 2011.** Photo courtesy of Dr David Kennedy	Each year recommendations are a number of erosion monitoring transects cross the major burial protection works (major burial works are defined here as those works intended to retain large quantities of sand in place to provide a cover and hence protection of burials, rather than individual burial mounds) and document the performance and condition of those works. Each year recommendations are made with regard to the maintenance of those works. In 2009 and 2010 it was noted that the Snake Island wave barrier no longer functions as designed and this condition continues in 2011. Planning should begin for the repair or replacement of the wave barrier or the installation of an alternative protection measure.
Condition 30: The LVCLPoM shall contain a strategy for the identification, assessment, monitoring, and where possible, management of all physical and biological processes affecting the stability of the lakeshore. The strategy will include the identification of priority areas for minimising erosion around the lakeshore, focusing on historically undisturbed sediments, especially those containing cultural material, or that with intrinsic geomorphologic significance. The Strategy shall also contain actions for the minimization of erosion, taking into account the broader cultural landscape values. Where significant erosion is monitored, the MDBA shall review the causes of the erosion, and provide a copy of that review to the Director-General. The review will include any measures proposed to reduce the rate of erosion, and the timetable for their implementation. Any changes to the strategies in the LVCLPoM resulting from information collected in the monitoring program must be referred to the LVAC for comment and approval by the Director–General.	Each year recommendations are shoreline geomorphology and erosion is monitored through the survey of 37 transect and visual inspections during surveying. These transects are surveyed annually and the majority are located in areas of high cultural value and zones where erosion is known to be a problem. In as far is possible, profile change is explained with respect to the process environment. Reporting of change on each profile always identifies when significant erosion of historically undisturbed sediments has occurred. Recommendations are made to SA Water when it is necessary to report significant erosion to the Director-General Office of Environment and Heritage.
Condition 31: All investigation, assessment and monitoring activities will utilise current best practice. The results of all the investigations, monitoring and assessment activities will be noted in the Annual Report.	Erosion monitoring utilises current best practice.

FURTHER COMPLIANCE ACTIONS UNDERTAKEN (CC27-37)

Report by the Lake Victoria Program Manager

- A recently installed weather station has begun collecting continuously logged data to be utilised by Dr Stephenson when analysing data in order to understand the processes involved in sediment movement on the Lake Victoria shoreline.
- A 'storm event trigger', which was developed by Dr Stephenson to alert staff of the need for an 'on the ground' monitoring response after a high energy wind event, is continually being refined via co-operative effort between the MDBA, NOW, Dr Stephenson and Graham Blair (Research and Development Officer – Department of Water – SA). It is anticipated that the data captured via 'storm event' monitoring will contribute towards an understanding of the impacts caused by discrete high energy wind events, and will also help to identify those impacts caused by wave action, as opposed to wind activity.

Erosion of the Noola foreshore
Courtesy of Digby Jacobs

MONITORING VEGETATION (Consent Conditions 30–37)

Report by Dr Ian Sluiter (Ogyris Pty Ltd)

Dr Sluiter's report is available upon request.

The Lake Victoria Annual Vegetation Monitoring Report for 2011 was compiled from field data collected between the 31st May and the 9th June 2011. Water levels within Lake Victoria during the floristic monitoring were held steady around 24.3 m AHD which meant that the vast majority of monitoring sites could be accessed during the June 2011 monitoring session. Only the outer 6 of 16 at East Moon (EM11-EM16), a low-lying site at West Nanya (WN07), the end quadrat at Snake Island (KSN10) and two quadrats (T110 and T111) between the South eastern Beach and the Talgarry Barrier at transect TG-1 could not be accessed due to inundation. The camera and photopoint board pegs at Talgarry North quadrat KTN10 had also completely rusted out and the site could not be found in 2011.

SUMMARY OF VEGETATION MONITORING RESULTS

Lake Victoria filled to capacity (27 m AHD) in November 2010 for the first time since September 2005. After the 2005 fill cycle, recovery was slow, but a positive response was noted in 2007 and 2008 before vegetation cover and biomass began to decline through 2009 and 2010. The response of the vegetation following the late 2010 fill cycle has been variable. Vegetation above 25 m AHD has improved at virtually all locations, but to varying degrees. The Talgarry Barrier and Frenchman's Creek, where poor vegetation cover and health had been noted in previous annual reports, has experienced a rapid increase in plant cover and biomass (see Figure 1 – Talgarry Barrier). The response has been positive but more muted at Frenchman's Islands lakeshore locations. Elsewhere around the Lake, with the exception of the Nulla Beach foreshore, vegetation cover and biomass have improved over 2010 levels.

Despite the removal of stock in January 2009, the Nulla Beach foreshore continues to have virtually no vegetation cover between the Noola/Nulla Nulla Station boundary fence all of the way around the Lake to a location immediately north of the Nulla vegetation monitoring transect near the southern boundary of the property. Here vegetation recovery has been measured, albeit at low levels. Figure 2 illustrates a quadrat on the outer beach at the Nulla vegetation monitoring transect where spiny sedge (*Cyperus gymnocaulos*) tussocks have regenerated since the removal of grazing. It is no coincidence that spiny sedge exists on the upper and middle sections of the beach of the adjoining property at Talgarry Station at moderately high plant cover and biomass levels. Most of the recovery on Nulla Station has been from vegetative propagules being released from Talgarry Station plants which have floated onto the beach and established aided by prevailing winds. Experience from the Noola and Lake Victoria Station grazing removal from the western side of the Lake in 2003 would indicate it may take up to 4–5 years before substantial recovery might be expected on the Nulla Beach. It is believed that the vegetation recovery on the Nulla Beach could be aided by the planting of vegetative propagules of spiny sedge and spiny mud-grass.

COMPLIANCE RESPONSE

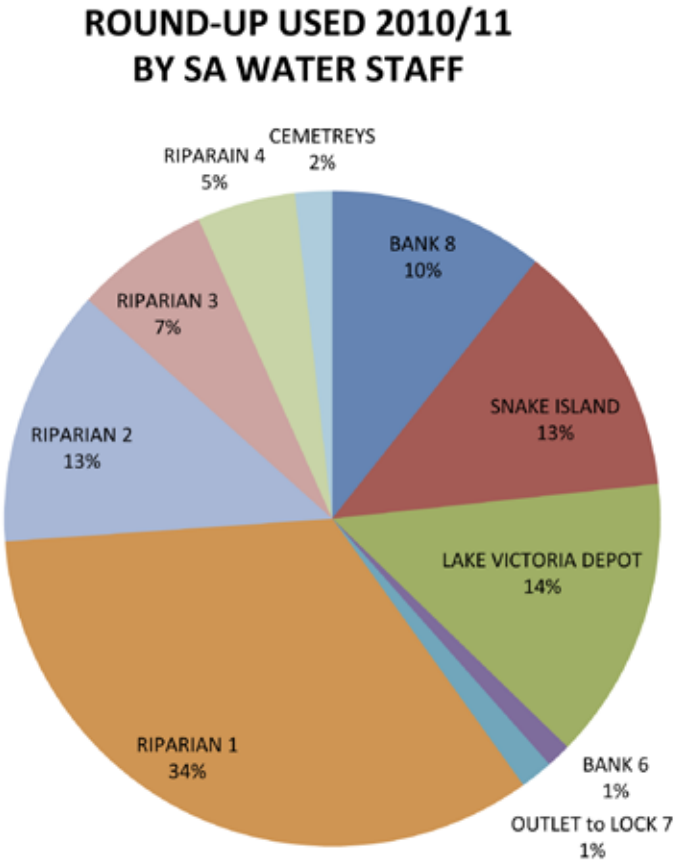
Flora Monitoring Consent Condition (NPWS 2006)	Compliance Response Winter 2010
Condition 32: The LVCLPoM will contain a strategy for the ongoing identification, assessment and monitoring of vegetation on the lakeshore. The strategy will include actions for the retention and enhancement of native vegetation on the lakeshore, taking into account the broader cultural landscape, cultural heritage values and natural attributes. Where natural significance values, in identified priority areas are demonstrably negatively affected by the operation of the Lake, and/or there is a measured decrease in the extent of vegetation cover by the plant species identified in the LVCLPoM, the MDBA will review the causes of vegetation decline and where possible, take appropriate corrective management action and report these to the Director-General.	The winter 2011 vegetation field assessment and reporting includes botanical and photopoint comparisons with previous data extending back to 1998 for 13 permanently located transects; with biomass and plant cover comparisons also made from 21 permanently located perimeter transects as well. In this way, botanical data is collected and reported upon allowing for feedback to the MDBA (via SA Water) of the status of the vegetation surrounding the Lake at the present time, but also within the context of the past twelve years. The 2009 Annual Vegetation Monitoring Report (Sluiter 2009) highlighted that the Talgarry Barrier, where a very large number of aboriginal burial mounds exist, was experiencing a significant decline in vegetation health. Some signs of recovery were noted in 2010 (Sluiter 2010) after a flood cycle to 26 m AHD. In winter 2011 positive recovery through significantly increased vegetation cover and biomass was measured across the Talgarry Barrier. The major increase in biomass is attributed to an increase in common reed (*Phragmites australis*) at higher elevations (25.5-26 m AHD) and an increase in spiny sedge (*Cyperus gymnocaulos*), couch (*Cynodon dactylon*) and spiny mud-grass (*Pseudoraphis spinescens*) biomass between 24.5-25.5 m AHD. Vegetation adjacent to the Frenchman's Creek which was in poor condition in winter 2009 and 2010 was substantially improved in winter 2011. The replacement of rusted, broken and missing metal droppers at permanent lakeshore vegetation monitoring locations with plastic posts is recommended as a very high priority.
Condition 33: The MDBA must monitor the nature and distribution of lakeshore vegetation, including both native and introduced species, and identify and assess the range of processes affecting these and their interactions.	Monitoring lines exist around the perimeter of the Lake and all plant species are measured, recorded and reported upon. The reasons for plant species expansions and declines are explained within this report. In the main, the 2011 response from vegetation was positive to the Lake fill-cycle to 27 m AHD which occurred in spring 2010.
Condition 34: Vegetation monitoring will also include assessment of the impact of vegetation on the sedimentation and erosion of sediments with in situ cultural heritage that have been identified as priority areas.	Monitoring is concentrated in culturally sensitive areas and occurs along the same transects as used in the Shoreline Change Study. Where significant sedimentation or erosion occurs, the vegetation response is noted.

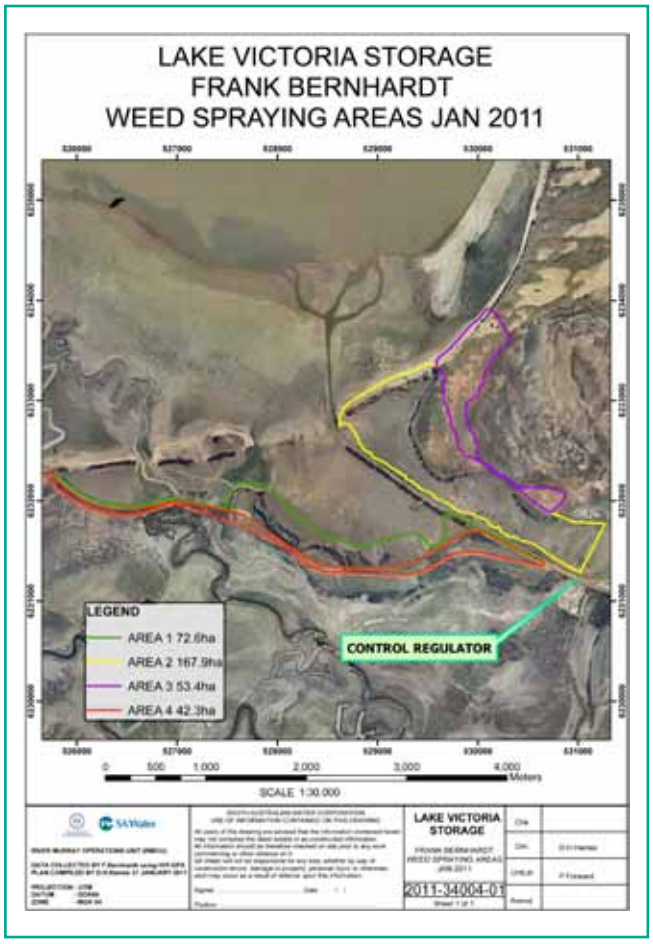
Flora Monitoring Consent Condition (NPWS 2006)	Compliance Response Winter 2010
Condition 57: In carrying out the activity, the MDBA must not damage any critical habitat, harm or pick any threatened species, population, ecological community or protected fauna, or damage their habitats. The MDBA shall therefore carry out all necessary monitoring to detect any risk of this occurring.	No threatened flora species or *Threatened Species Conservation Act 1995* listed plant communities have been recorded from the consent area at Lake Victoria. Threatened plant communities listed by Benson (2006) do occur in areas surrounding the Consent area which are managed by either SA Water or the New South Wales Office of Water.

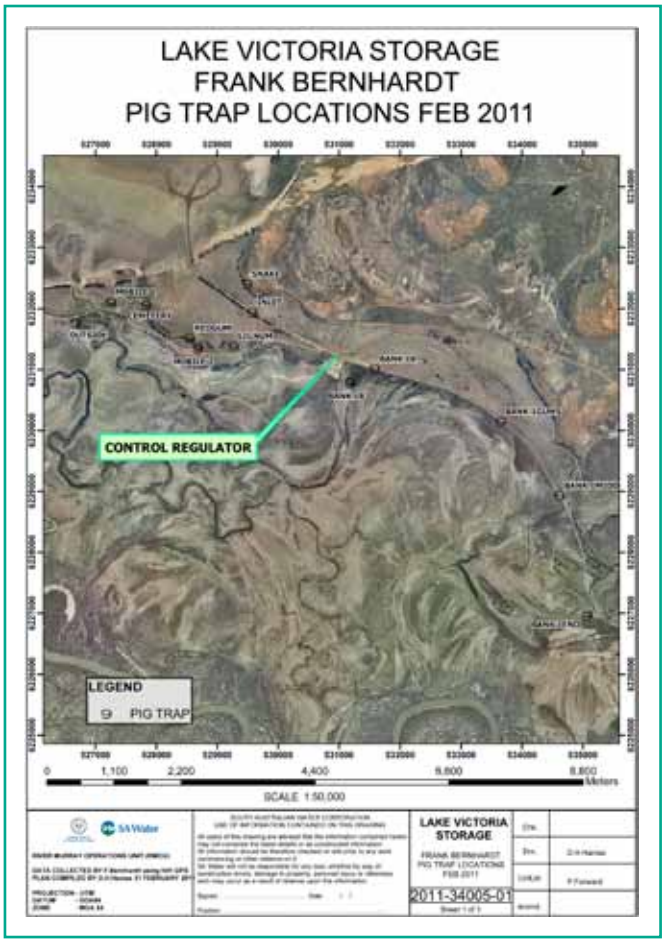
The Talgarry Barrier on 8th June 2011 at approximately 25.5 m AHD showing the substantial expansion of the common reed (*Phragmites australis*) fringe on the barrier at an elevation where numerous burial protection works exist.

MANAGEMENT OF WEEDS (CONSENT CONDITIONS 32–33)

	Compliance Response ✓
The MDBA must monitor the nature and distribution of lakeshore vegetation, including both native and introduced species. **Consent Condition 33**	• With higher than usual rainfall experienced over the 2010 summer/autumn period, extensive weed control has been required, with most effort by SA Water staff undertaken on the treatment of 'horehound' (*Marrubium vulgare*) along the western margins as lake levels fluctuated. Access to the lakebed was restricted for large periods of time. • Other weeds treated by SA Water staff were 'deadly nightshade' (*Atropa belladoma*), 'scotch thistle' (*Onopordum acanthium*) and 'spiny emex' (*Emex australis*). • Mr Frank Bernhardt has also treated 'Noogoora burr' (*Xanthium pungens*), 'Bathurst burr' (*Xanthium spinosum*) and 'horehound' over summer/autumn within the area defined by the LVCLPoM. • SA Water purchased a new 600 litre weed spraying unit and 'wick wand' for placement on front of an ATV for the treatment of weeds. • A complimentary weed control program was undertaken by NOW, specifically for the treatment of horehound within the Nulla lunette area.





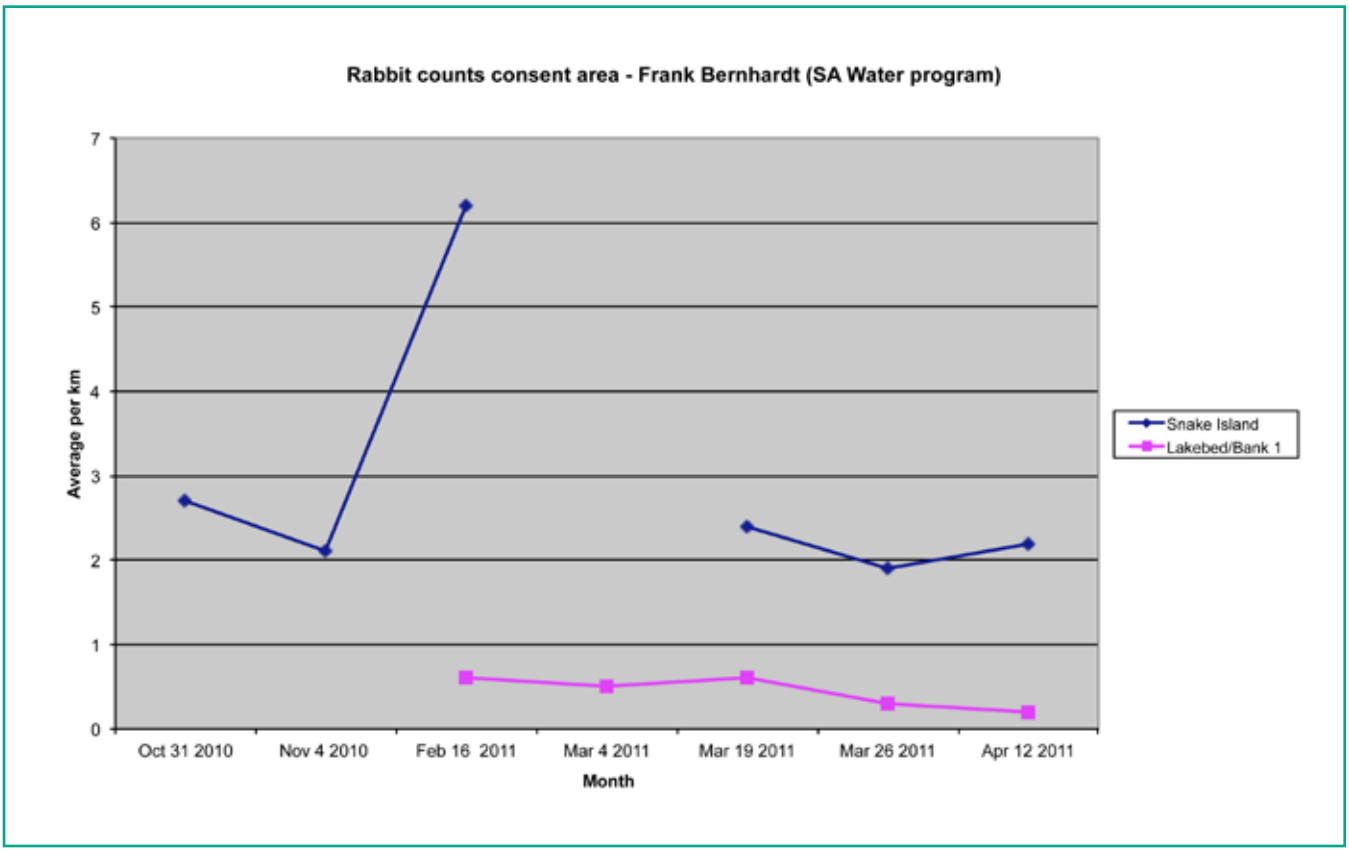


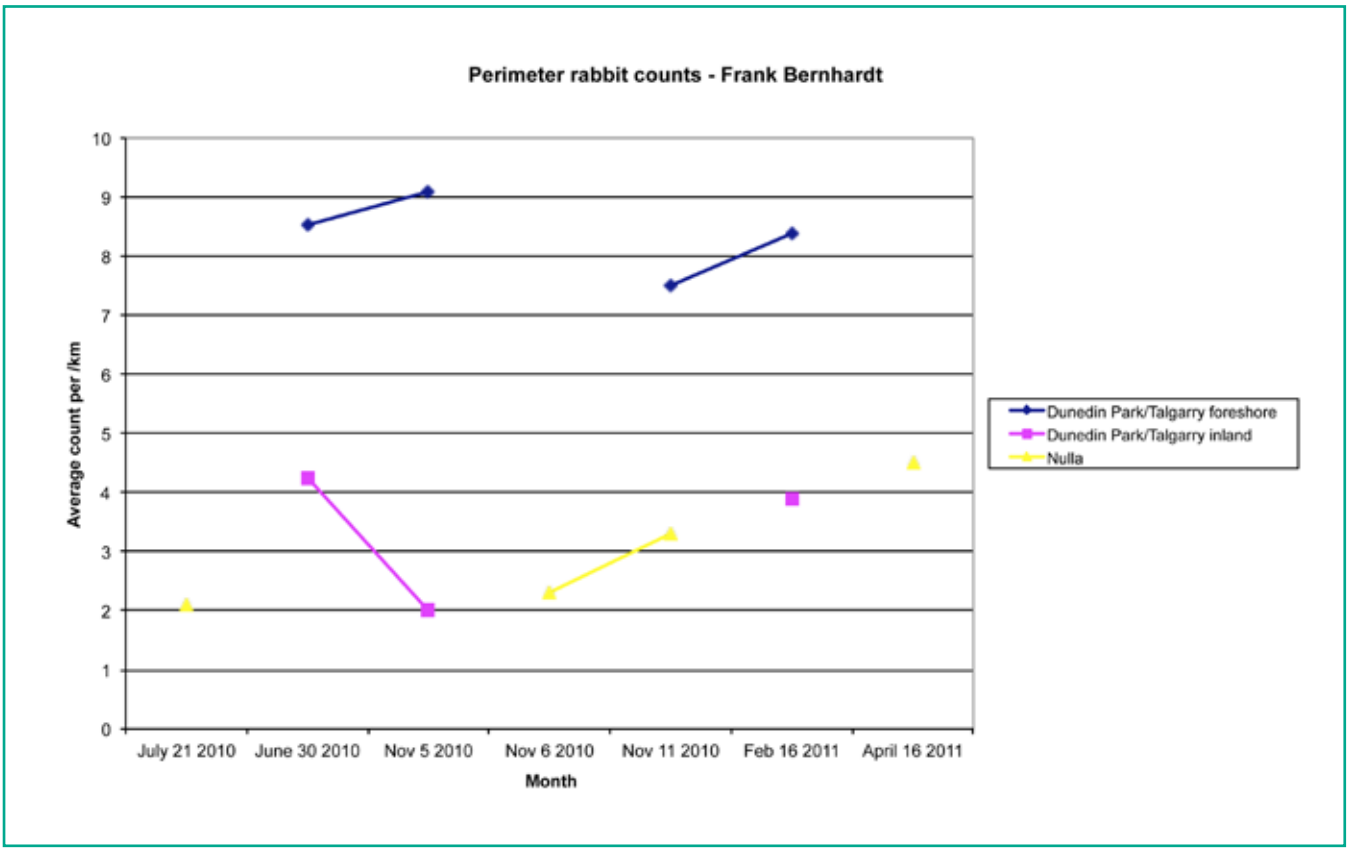
Sprayed horehound along the western foreshore
Photo courtesy of the SA Water Cultural Heritage Management team

The new wick wand used to treat weeds
Photo courtesy of the SA Water Cultural Heritage Management team

MANAGEMENT OF NON NATIVE FAUNA (CONSENT CONDITION 35)

	Compliance Response ✓
Consent Condition 35 Feral animal control works within the SA Water land management program.  **SA Water staff undertaking rodex works.** Courtesy of the SA Water management team  **Wade putting out rabbit bait.** Courtesy of the SA Water management team  **Pig in traps.** Courtesy of Frank Bernhadt	*Rabbit control* • Rabbit numbers over the period have risen compared to the 2009–10 reporting period due to the following factors: – higher than normal rainfall leading to regrowth and conditions favourable for breeding. – an inability to access baits from the Western Livestock Pest Authority throughout the later months of 2010 and early 2011. – inaccessibility to some areas, mainly due to wet conditions. • Population of numbers remain highest along the Eastern foreshore where a rodexing treatment and mapping program was undertaken early in the 2011-2012 reporting period, in conjunction with a baiting and shooting program. • One thousand five hundred and thirty seven warrens (1,537) were treated and 690 kg of baits were laid between July 2010 and March 2011 within an approximate, one kilometre zone from the Eastern foreshore. • Rodexing, baiting and shooting was also undertaken on Nulla Station as a follow up to a previous rodexing program close to the foreshore, with 99 warrens treated over a 40.5 hour period in June 2011. • SA Water staff implemented rabbit controls within the Noola conservation reserve in July 2010, with warrens also rodexed in September. • An OH/S safety plan for use of the rodex equipment is presently being developed by SA Water to allow continued use of this equipment in the future. • NOW continues to liaise with neighbours to ensure that a coordinated and integrated treatment program is implemented. This will be especially vital as we head into the new reporting period to ensure that rabbit populations are contained in these very favourable breeding conditions, and to ensure that shoreline vegetation gains are not placed at risk from overgrazing. • Rabbit proof fencing was placed around all three cemeteries in July 2010 by SA Water staff. *Pig control* • Mr Bernhadt was engaged for 96 hours to undertake a pig abatement program involving surveillance, and the setting/checking of seven pig traps with associated cameras. • Overall 11 pigs were destroyed by Mr Berhardt with neighbour, Paul Cohrs reporting that a further 40 pigs were destroyed south of the Lake in April, reducing impacts within the Lake area. Fencelines • While the lake was low in April, all stock fences were checked by SA Water staff.





Note: A count that is higher than 2.5-3 rabbits per km triggers treatment response.

SALINITY AT THE LAKE VICTORIA SHORELINE

(Consent Conditions 37–38, 42–44)

Report by Robert Brownbill, Hydrogeologist, NSW Office of Water

A statement in relation to the compliance with these Consent Conditions is provided below.

Consent Condition	Compliance Response ✓
Consent Condition 37: The MDBA will ensure that the implementation of the CLPoM continues to address the health of the aquatic environment of the Lake. The MDBA will ensure that water salinity monitoring continues. The MDBA will include water quality monitoring information related to Lake Victoria in the Annual Report.	**Compliance: Yes.** Groundwater quality (salinity) is monitored at Lake Victoria in two ways; by taking water samples from monitoring bores, and by using geophysical techniques. Groundwater samples are taken from bores positioned underneath the lake bed and on the lake shore. Monitoring bores are also located in the floodplain area to the east of the lake. Sampling occurs at varying frequency, but generally 3 to 4 times per year, and almost always at least annually. For the 2010-11 report, groundwater quality results have been presented for 28 bores, as salinity (EC, uS/cm), for records extending from 1999 to 2011.Generally there are no clear increasing or decreasing trends in salinity levels over time, however very subtle quality improvements can be seen in a number of locations. Groundwater salinity generally increases with depth. Geophysical monitoring of salinity comprises electromagnetic surveys along established transects perpendicular to the lake shore, and down bore hole electromagnetic surveys. The results of the geophysics indicate that groundwater salinity is not worsening in the vicinity of the lake. **Action Recommended:** Nil
Condition 42: The MDBA will conduct a process to quantify the impacts of the operation of Lake Victoria and Frenchman's Creek on neighbouring properties in the interests of achieving an enduring agreement with affected landowners.  **Ground water monitoring bore hole with tower in the bed of Lake Victoria.** Courtesy of Andrew Cannard	**Compliance: Yes.** The impact of Lake Victoria operations on neighbouring properties is assessed by monitoring groundwater levels beneath the River Murray floodplain to the east of the lake, and under adjacent higher areas surrounding the lake. Shallow groundwater levels can result in soil salination. Data loggers record groundwater levels continuously in 53 monitoring bores. Results from 15 selected representative sites have been presented in the 2010-11 report. Groundwater levels universally declined at a steady, yet modest rate over the extended dry period from 1999 to 2010. Very high rainfall in the most recent 18 months has caused groundwater levels to rise significantly faster than the declines earlier recorded. However current levels remain below or similar to levels recorded in 1999. Rainfall variation is the main influence on groundwater level change. The effects of Lake Victoria operations on groundwater levels in neighbouring areas has likely reached a long-term equilibrium, and any variation in the future will likely be governed by the medium to long-term deficit or surplus of rainfall. **Action Recommended:** Nil

Consent Condition	Compliance Response ✓
Condition 44: The MDBA will ensure that groundwater levels around the Lake and its adjacent supply channels will continue to be monitored and that there is ongoing revision of mapping of areas affected by salinity as information from monitoring and modelling indicates changes to the groundwater levels in the area. The MDBA must implement appropriate management strategies to prevent impacts on the environment resulting from any rise in groundwater, likely to be contributed to by the operation of the Lake and report these in the Annual Report. Such strategies must include a timeframe for implementation. If approved by the Director General, these strategies will be implemented by the MDBA.	**Compliance: Yes.** Groundwater level monitoring is undertaken at 13 bores located in the bed underneath the lake and the lake shore. Data loggers are used to collect a continuous record of groundwater level movement. Because of the high and variable groundwater salinities (hence densities), groundwater heads are adjusted to correct for the pressure variations which result. This allows for an accurate comparison of surface water and groundwater heads from differing depths, thus deriving an accurate interpretation of groundwater flow potentials. Groundwater level monitoring on the lake bed shows a decline in groundwater levels associated with the lower lake operating levels between 2006 and mid 2009, and a rise with higher lake levels since. The decline in groundwater levels were between 2 to 3.5m at the sites in the lake bed. Since mid 2009 groundwater levels have risen in response to the higher lake operating levels. This has resulted in a subtle decrease in groundwater salinity at some of the monitoring sites. The interchange between deeper groundwater, the water table and the lake is spatially variable and dynamic. When the lake is at certain levels, or during changes in level, groundwater can move into the lake in certain locations. This is most prominent at Talgarry Wells. **Action Recommended:** Nil
Condition 46: If any Aboriginal object found is likely to be damaged, destroyed or defaced by salinisation due to changes to groundwater resulting from the Activity, and that object is not included in the approval granted under this consent, then the MDBA must immediately notify the Director General.	**Compliance: Yes.** Electromagnetic survey results suggest that groundwater salinity is not worsening in the vicinity of the lake, and no clear medium to long-term trend (since monitoring began in 1999) in rising groundwater levels has been witnessed. These two lines of evidence indicate that near-surface salination is not worsening under the current operational activity. **Action Recommended:** Nil

FURTHER COMPLIANCE RESPONSE

Report by the Lake Victoria Program Manager

The MDBA/NOW requested a review of the Lake Victoria regional groundwater monitoring program as advised by the SRP. A meeting was consequently held on the 20th of April 2011, between staff of the MDBA, SA Water and NOW to begin the review process. Recommendations will be provided by NOW to the MDBA within the next reporting period.

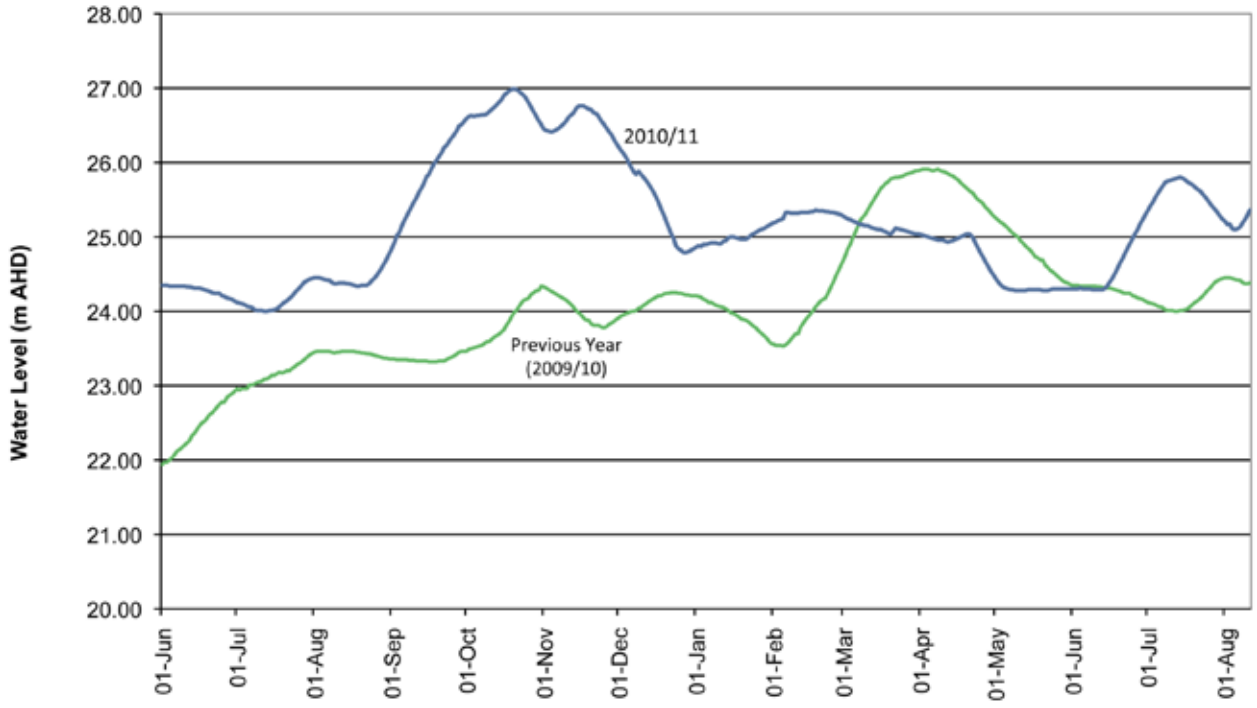
MONITORING WATER QUALITY (CONSENT CONDITION 37)

Report by SA Water

Component	Samples	Min	Max	Ave
Blue Green Algae – Total	51	0	3360	140
Colour – True (456nm)	51	<1	80	30
Conductivity	50	95	241	195
pH	51	7	8.3	7.8
Temperature	48	8.2	29.2	16.8
Total Dissolved Solids (by EC)	50	52	130	107
Turbidity	51	53	230	128

LAKE OPERATIONS (CONSENT CONDITIONS 38–41)

By Hugo Bowman (Riparian Project Officer), River Murray Operations



Lake Victoria water level June 2010 to August 2011

The operation of Lake Victoria within the 2010–2011 reporting period demonstrated how management of the Lake can provide for a balance between the competing needs of water supply, cultural heritage protection and environmental requirements.

The Murray—Darling Basin received unusually high inflows during the 2010—11 water year, including the highest inflows on record for December, January, February and March, with many areas of the Basin experiencing flooding. This resulted in active storage increasing to above the long-term average, and a forecast of expected continued high flows to SA for several months after. These high flows, combined with the forecast issued by the Bureau of Meteorology for 'wetter than average' conditions to persist, resulted in the operation of Lake Victoria as stipulated in the Lake Victoria Operating strategy (LVOS) to be reviewed. River Murray operators sought suggestions for targeting operations within the LVOS to provide favourable conditions for the foreshore environment at Lake Victoria.

The LVOS states that Lake Victoria should be refilled to full supply level (FSL) of 27 m AHD as late as possible in the year, and then, commencing late February, be drawn down to 26.5 m by the end of February, 25.6 m by the end of March and 24.5 m by the end of April.

However, section 4.3 of the LVOS states that;

> *'Deviation from this operating strategy is permitted to enhance vegetation establishment, in key areas or following a significant setback. Altered operation for this purpose will be opportunistic, and hence will need to be based on a case by case basis. Options such as lower refilling targets or earlier drawdown to reduce the period of inundation may be desired'.*

Consultation with the Lake Victoria Scientific Review Panel (SRP) resulted in a recommendation to minimise the time the lake was held full, and to commence draw down as soon as possible, particularly to provide favourable conditions for the foreshore vegetation. The MDBA therefore decided to alter from normal operations but remained within the basic rules of the LVOS in consultation with, and by the endorsement of the OEH and the LVAC.

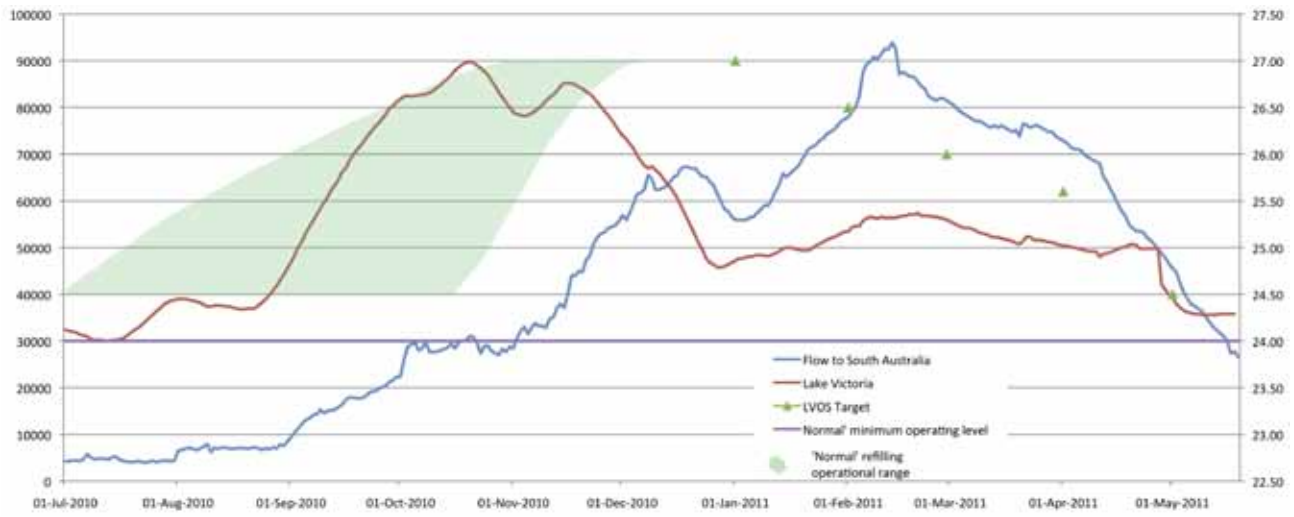
Drawdown commenced immediately after full supply was attained in mid-October, with another increase to 26.75 m AHD in mid November to cater for works being undertaken downstream. By December, a level of 24.8 m AHD was reached, thereby minimising inundation duration of the majority of the vegetated shoreline, though it was maintained at a height above the elevation of the HUS erosion scarp (ancient palaeosols) at around 24.5 m AHD, to avoid impact by waves.

As flows to SA continued to remain high and increase, the lake was raised to 25.3 m AHD, the necessary level to prevent a reverse head being established at the Lake Victoria outlet regulator on the Rufus River, thereby allowing the River Murray operators to maintain some control over the lake and ongoing high flows to SA.

The level of 25.3 m AHD was held relatively steady during February, after which time the lake was slowly drawn down to 25.0 m AHD by mid March as flows to SA receded. This level (25.0 m) was held steady for later than would normally have been the case due to requests from Lock operators downstream to not release additional water from the lake so the rate of recession of flows in the Murray River was not prolonged.

Following this, in order to conform to the LVOS target of 24.5 m AHD by the end of April, and below this to 24.3 m AHD as requested by the Lake Victoria Program Manager to facilitate maximum access for the annual monitoring programs, the lake was rapidly drawn down to a level of 24.3 m AHD by early May.

The Lake Victoria regulator was also used to improve water quality in early 2011 by increasing the level of dissolved oxygen from around 2–3 to 8-9 mg/L, which had been caused by the high leaf litter content of flooded water.



The operation of Lake Victoria over the 2010/11 water year. The plot shows the 'normal' refilling operational range, and the LVOS targets. Under a dry scenario refilling of the lake would commence earlier, whereas under a wetter scenario, refill would commence later.

IMPACTS ON AREAS OUTSIDE OF THE LAKE (CONSENT CONDITIONS 42–47)

Consent Condition	Compliance Response ✓
Consent Conditions 42–47	• The MDBA continues to negotiate with landholders in the interests of achieving enduring agreements. • The MDBA continues to maintain awareness of other plans, particularly in relation to the delivery of environmental flows via the 'The Living Murray Project' and the Murray—Darling Basin Plan. • Regional groundwater quality and levels continue to be monitored by NOW and SA Water on behalf of the MDBA, however the program is subject to review (CC 37- 44 above). • In addition, SA Water continues to operate the Rufus River Salt Interception Scheme to capture saline groundwater before it enters the River Murray. This scheme was established to mitigate regional salinity impacts, partly contributed by the combination of Lake and River Operations.

RECOMMENDATIONS FOR ALTERATION TO THE PLAN OF MANAGEMENT

- Please refer to recommendations provided within this section of the 2007-2008, 2008-2009 and 2009 – 2010 annual reports.
- The following additional alterations are recommended:
  1. Add to the 'Works Procedures' Section the 'Induction' materials as previously developed, and include the requirement for cultural heritage awareness training to be undertaken by all new employees, and delivered by members of the BMEC (LVAC59).
  2. Add the amended Protocols (1, 2, 3, 4 and 7), new Protocol (8) and associated 'Flow Charts' once agreed by LVAC stakeholders.
  3. Add the agreed MDBA monthly 'site visit checklist' to the Works Procedures Section.
  4. Replace the original version of the 'Procedure for Burial Mound construction and maintenance' with the updated version which includes the traditional burial protection method.
  5. Add a new Works Procedure to address OH/S issues related to future discovery of WW2 fighter plane training ammunition.
  6. Add a Works Procedure to clarify the process to be undertaken to ensure that both the SA Water and A.H.I.M.S datasets always match by documenting the process for the transfer of data.
  7. Take photos out of the technical burial protection works section from the public version of the new LVCLPoM.
  8. Add to the Works Procedure section the documented advice provided by Dylan Ostler about planting, propagation and use of the green house.

An old WW2 unexploded ammunition.
Courtesy of SA Water Cultural Heritage Management team

BUDGET

Lake Victoria Consent Works 2010–11

Work order	Work order description	Original Budget	Labour	Contracted Labour	Materials – store supply	Materials – external	Fuels and Oils	
PROTECTION OF BURIAL SITES								
MD710501	MONITORING CH WORKS (ROUTINE)	136,000	36,556.56		752.87		527.09	
MD710502	ABORIGINAL BURIAL SITE MAINTENANCE		1,471.16		1,635.45		28.64	
MD710503	ABORIGINAL ARTEFACT MAINTENANCE		456.17				14.56	
MD710504	BMEC ONSITE MONITORING		44,537.68					
MD710505	WAGES				446.37			
MD710506	PLANT AND EQUIPMENT							
MD710507	VEHICLE COSTS		26,758.80				118.37	
MD710508	MISCELLANEOUS							
		136,000	**109,780.37**	**0.00**	**2,834.69**	**0.00**	**688.66**	
MONITORING OF FLORA AND EROSION								
MD710520	EXTERNAL CONSULTANTS	174,000	7,041.03				496.67	
MD710521	MONITORING OF FLORA AND EROSION		150.89				49.49	
MD710522	REVEGETATION		3,408.48			2,115.76		
MD710523	WAGES		9,373.34					
MD710524	PLANT AND EQUIPMENT							
MD710525	VEHICLE COSTS							
MD710526	MISCELLANEOUS		995.03					
		174,000	**20,968.77**	**0.00**	**0.00**	**2,115.76**	**546.16**	
FORESHORE MANAGEMENT & LAND MANAGEMENT								
MD710540	CONTRACT LABOUR	225,000						
MD710541	MATERIALS					1,768.60		
MD710542	ACCESS TRACK MAINTENANCE						182.38	
MD710543	PEST CONTROL		4,298.04				155.35	
MD710544	WEED CONTROL		22,716.41		13,336.17	1,956.10	1,252.10	
MD710545	NURSERY COSTS		23,001.52			800.32		
MD710546	BMEC ONSITE MONITORING							
MD710547	WAGES		23,862.33					
MD710548	PLANT AND EQUIPMENT							
MD710549	VEHICLE COSTS							
MD710550	MISCELLANEOUS							
		225,000	**73,878.30**	**0.00**	**13,336.17**	**4,525.02**	**1,589.83**	
LAND AND PROPERTY MANAGEMENT NOOLA & LAKE VICTORIA								
MD710560	FLORA & EROSION MANAGEMENT	92,000	642.48			1,995.45	85.54	
MD710561	PEST CONTROL		3,116.45				9.24	
MD710562	WEED CONTROL		549.62	5,040.00	1,909.00		138.79	
MD710563	WAGES		1,221.74					
MD710564	PLANT AND EQUIPMENT (INCL NOOLA PUMPS)		74.62			345.46	7,925.22	
MD710565	VEHICLE COSTS							
MD710566	MISCELLANEOUS		2,632.24					
		92,000	**8,237.15**	**5,040.00**	**1,909.00**	**2,340.91**	**8,158.79**	
COMMUNICATION								
MD710580	INFORMATION BAY	16,000	870.77					
MD710581	MISCELLANEOUS		402.39			64.77		
MD710582	ACID		73.44					
		16,000	**1,346.60**	**0.00**	**0.00**	**64.77**	**0.00**	
NULLA PUMP STATION								
MD710901	NULLA PUMP STATION	**27000**	**1,132.92**				**5,968.64**	
PURCHASE MINOR PLANT CH								
MD710902	PURCHASE MINOR PLANT CH	**5000**				**6,447.43**		
TRAINING								
MD710903	TRAINING		**1,858.06**			**137.73**	**89.55**	
TOTAL		**675,000**	**217,202.17**	**5,040.00**	**18,079.86**	**15,631.62**	**17,041.63**	

Please note the additional funding provided by the MDBA to support BMEC facilitation.

	Vehicle registration	Plant and vehicle repair	Services provided by contractors	Chemicals	Mobile phone	Workers comp insurance	Travel	Total spend	Var total/ original budget
			2,186.96		428.83	5,629.25	1,216.65	47,298.21	
		740.72						3,875.97	
								470.73	
								44,537.68	
								446.37	
	-118.90							-118.90	
							1,626.18	28,503.35	
								0.00	
	-118.90	**740.72**	**2,186.96**	**0.00**	**428.83**	**5,629.25**	**2,842.83**	**125,013.41**	**-10,986.59**
		21.00	75,364.00					82,922.70	
			17,000.00					17,200.38	
			400					5,924.24	
								9,373.34	
								0.00	
								0.00	
		21.90					665.75	1,682.68	
	0.00	**42.90**	**92,764.00**	**0.00**	**0.00**	**0.00**	**665.75**	**117,103.34**	**-56,896.66**
								0.00	
				908.00				2,676.60	
		620.91						803.29	
			21,396.36					25,849.75	
		369.64	48,416.73					88,047.15	
								23,801.84	
								0.00	
								23,862.33	
		1,135.40						1,135.40	
								0.00	
								0.00	
	0.00	**2,125.95**	**69,813.09**	**908.00**	**0.00**	**0.00**	**0.00**	**166,176.36**	**-58,823.64**
								2,723.47	
								3,125.69	
			46,976.73	1,956.10				56,570.24	
								1,221.74	
		419.56						8,764.86	
								0.00	
								2,632.24	
	0.00	**419.56**	**46,976.73**	**1,956.10**	**0.00**	**0.00**	**0.00**	**75,038.24**	**-16,961.76**
								870.77	
							4,881.97	5,349.13	
								73.44	
	0.00	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**4,881.97**	**6,293.34**	**-9,706.66**
		755.76						**7,857.32**	**-19,142.68**
								6,447.43	**1,447.43**
			5,963.35					**8,048.69**	**8,048.69**
	-118.90	**9,297.77**	**217,704.13**	**2,864.10**	**428.83**	**5,629.25**	**8,390.55**	**511,978.13**	**-163,021.87**

ABBREVIATIONS

AHIMS	Aboriginal Heritage Information Management System
AHD	Australian Height Datum
BMEC	Barkindji Maraura Elder Council
HUS	historically undisturbed sediment
LVAC	Lake Victoria Advisory Committee
LVCLPoM	Lake Victoria Cultural Landscape Plan of Management
LVOS	Lake Victoria Operating Strategy
LVWG	Lake Victoria Working Group
NOW	NSW Office of Water
MDBA	Murray—Darling Basin Authority
OEH	Office of Environment and Heritage
SRP	Scientific Reference Panel

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LAKE VICTORIA ADVISORY COMMITTEE MEMBERS (2010-11)

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Jim Abdulla	BMEC
Kingsley Abdulla	BMEC
Timothy Abdulla	BMEC Deputy Chairperson
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Craig Bretherton	DECCW
Brian Carter	BMEC
Katie Davis	MDBA
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