Lake Bryde Recovery Catchment

Annual Report 2004

by
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1.0 Summary

Significant delays in momentum have been experienced in the recovery catchment team during 2004, due to staff turnovers. A new Recovery Catchment Officer and Assistant Recovery Catchment Officer commenced work in June and July 2004 respectively.

Monitoring programs have been continued including groundwater depth, soil salinity, vegetation condition using multi-spectral imagery and installation of surface water flow gauges. Monitoring of the threatened ecological community of *Muelenbeckia horrida* subsp *abdita* and *Tecticornia verrucosa* continued also. The two populations have remained stable during 2004.

The development of a rainfall – runoff model was completed along with accurate topographic surveys of major valley floor flow impediments. This information has been used for preliminary engineering design of surface water management structures on the valley floor.

Surface water management works on both crown land and private property have been the main focus of the recovery project during the reporting period. The development of valley floor surface water structures has progressed to completion of a preliminary engineering design and feasibility study undertaken by Maunsell Australia. An Environmental Impact assessment of this preliminary engineering design is currently being completed and it is intended that the project will proceed with detailed design and construction of valley floor surface water engineering structures during 2005.

On ground works included revegetation with oil mallee species, remnant vegetation fencing, and private property surface water management engineering works, implemented as cost share agreements during 2004. The engineering works installed have been reviewed and cost share incentives will continue during 2005, however drought conditions have affected landholders ability to invest in landcare activities.

Having a full recovery team in place and a better understanding of hydrological processes, will enable the project to progress efficiently with further development of recovery strategies and implementation of on ground works.

2.0 Introduction

The Lake Bryde Recovery Catchment is identified as a Natural Diversity Recovery Catchment by CALM under the State Salinity Strategy. It has high natural diversity that is at risk from rising water tables and salinity, warranting investment in the recovery and protection of these values.

The aim of the Lake Bryde Recovery Catchment is:

'To slow the rate of decline of biodiversity across valley floor assemblages and to conserve specific high value assets'

There are approx. 50 landholders in the catchment, with most farms owned by local families although there are a small number of absentee landholders. Landholders are to a large extent supportive of the project, however are keen to see implementation of works within the catchment.

The 120 000 ha catchment is located on the rim of the Avon catchment system. The catchment is characterised by moderate grade shedding hill slopes, delivering flows to extensive flat braided watercourses via moderately incised creek lines. Soil types vary from lateritic and duplex dominated hill slopes and shallow duplex and clayey flats. Hydrologically, the catchment is characterised by impermeable aquifers and low hydraulic gradients.

The catchment contains approximately 35% native remnant vegetation, situated mainly within large nature reserves vested with the Conservation Commission and managed by the Department of Conservation and Land Management. Much of the reserve system is contained within the Lake Bryde and Lakeland Nature Reserve, situated on the valley floor and the large Lake Magenta Nature Reserve located in the southeastern part of the catchment.

The Lake Bryde wetland complex is considered to have high natural biodiversity, however it has already undergone significant degradation over the last decade or so and continues to be impacted by surrounding land use practices.

Prolonged inundation has been identified as the dominant hydrological process driving the degradation of the flat valley landscape. The increased runoff in the catchment since vegetation clearing has resulted in an increased frequency of inundation. The raised road formations in the valley floor are largely responsible for impeding flow continuity, resulting in increased likelihood of ponding across the broad valley flats. These processes are threatening important assets in the wetland system such as the nature reserves and the Critically Endangered Threatened Ecological Community (TEC): *Muelenbeckia horrida* subsp *abdita* and *Tecticornia verucosa*.

Recovery strategies developed to date have been primarily focused on the management of surface water with the catchment. Surface water management works identified for the broader catchment have progressed to a point where implementation has proceeded on private property. Surface water management works for the valley floor are currently being investigated and preliminary design of structures has commenced. Monitoring and investigations into surface water – ground water interactions are continuing, however the main focus at this stage is managing surface water processes within the catchment. An integrated approach of revegetation and engineering works are being implemented to manage these processes.

3.0 Project Structure

The Lake Bryde Recovery Project is run from the Katanning District Office of CALM, with the District Manager providing overall managerial responsibility for the plan. The recovery catchment team had a significant turnover of staff during 2004. The position of Recovery Catchment Officer and Assistant Recovery Catchment Officer have been vacant for the period March to June 2004, as Matt Giraudo and Jane Larson vacated these positions during March 2004. Darren Coulson commenced in the position of Recovery Catchment Officer on 21st June 2004, Natalie Nicholson commenced in the position of Assistant Recovery Catchment Officer on the 5th July 2004.

3.1 Project Implementation Team:

Project staff includes the:

- *Recovery Catchment Officer* – responsible for contract and staff management, executive support to committees, budgeting, supervising and managing contracts, undertaking investigations and directing the implementation of the project.
- *Assistant Recovery Catchment Officer* – responsible for monitoring, managing data, supervising contracts and assisting the Recovery Catchment Officer.
- *Revegetation Officer* - employed part time – responsible for managing revegetation projects within the catchment, including those on private and public land, for the development of a revegetation strategy and providing advice to landholders undertaking revegetation within the catchment.

Alan Kietzmann - *District Manager - Katanning (CALM)*
Darren Coulson - *Recovery Catchment Officer (CALM)*
Natalie Nicholson - *Assistant Recovery Catchment Officer (CALM)*
Gavan Mullan – *Revegetation Officer (CALM)*

3.2 Committees and Management Groups

The overall direction of the project is managed by two committees / groups.

i) *Lake Bryde Recovery Team:* This is the community reference group for the project, providing a mechanism for the local community to have input into the direction of the project. This committee meets once – twice a year to discuss the direction and progress of the project and to provide community input into major outcomes. During 2004 there was one meeting of the Recovery Team (plus all lanholders within catchment were also invited) held during September. Minutes of the meeting are attached.

ii) *Technical Reference Group*: This is a group of professional staff representing the WADA, WRC, CSIRO, CALM Science and WASCU. The charter of the group is to provide technical support to the project and to underpin the development and implementation of the Recovery Plan. Meetings occur as required, however no meetings were held during 2004.

4.0 Major Project Focus

Surface water management remains the major focus for the Recovery Catchment during 2004. After the initial EIA of the 'Surface Water Assessment and Recommendations' report (Engineering Water Management Group, Department of Agriculture) highlighted risks and knowledge gaps, a series of investigations and information gathering was undertaken in 2003 and the early part of 2004. The project moved forward to a stage where an independent consultant was engaged to undertake a preliminary engineering design evaluation and costing. A revised EIA is currently being undertaken to assess the net impacts of the surface water management engineering solutions proposed by Maunsell Australia in this preliminary report.

Also surface water engineering works commenced on private property through cost share agreements. Desktop plans were completed for the majority of the catchment in the latter part of 2003 and on ground works commenced on several properties with water management and harvesting structures constructed throughout the catchment in May 2004. These works were reviewed in November 2004 together with the broad based banks installed during 2003. The report highlighted problems with planning, but mostly a lack of supervision during construction which has resulted in some structures being implemented which do not conform to industry best practice standards. Cost share guidelines will be reviewed and surface water management plans revised prior to implementation of further works planned for autumn 2005.

5.0 Status of the TEC

Minimal work has been undertaken during the year on investigations or implementing recovery actions for the threatened ecological community of *Muelenbeckia horrida* subsp *abdita* and *Tecticornia verrucosa* within the Recovery Catchment during 2004. Six monthly recordings of height, diameter, reproductive status of tagged specimens within permanent plots in Lake Bryde and East Lake Bryde populations were completed in July and December 2004.

Both populations have remained stable during the year. Some recruitment of seedlings has been observed during visual observations, however these have not been reflected in the permanent plots set up at the two populations. No significant decrease in live plants was recorded at either population. Seed set was observed on mature plants in both populations during spring/summer 2004. A slight increase in soil salinity as measured by EM38 survey was observed in East Lake Bryde, and a slight decrease was observed in Lake Bryde.

The range of live plants will be recorded in 2005 and related to soil salinity measurements. A program of seed and cutting collection from both populations will also be undertaken during 2005. Monthly observations of both populations will be recorded during 2005 also.

Muelenbeckia horrida subsp abdita seed set underneath mature plant – Jan 05

6.0 Recovery Actions

6.1 Investigations

6.1.1 Valley floor Surface Water Engineering Works – Maunsell Australia Pty Ltd were contracted to undertake a preliminary engineering design and route alignment based on Farmer *et al* 2002 report. A site inspection was undertaken in November 2004 with route selection and preliminary engineering design and costings finalised in early 2005. The preliminary engineering design indicates that the surface water engineering options are feasible from an engineering and economic point of view. The modelling component of engineering design is currently being undertaken and detailed design of various stages of project will be completed in 2005. An EIA discussing the net impacts of the surface water management options outlined in Maunsell report is currently being undertaken and detailed engineering design could begin once approvals for works are obtained.

6.1.2 *On-farm Remnant Inventory*: An inventory of on farm remnant vegetation was undertaken in 2003 to better understand the distribution of remnants within the catchment. The report was completed in early 2004 and will be used to develop a revegetation strategy for the catchment and define priorities for remnant fencing and revegetation cost share agreements.

6.1.3 *Surface water management engineering review*. Martyn Keen from Department of Agriculture, Bunbury conducted a site visit and prepared a report reviewing surface water management structures implemented on private property during 2003/2004. Issues with planning and implementation of the works have been identified and are being reviewed prior to further on ground works.

6.1.4 *Topographical Surveys*. Accurate (sub 25 mm) topographical survey of the 14 Mile Rd floodway and surrounds was conducted by a licensed surveyor during November 2004. This information has been used to design downstream drainage of this floodway and culvert to a designated disposal lake.

Topographic surveys of major road floodways and culverts throughout the valley floor including Ryan's Rd, Lake Bryde Rd, Newdegate-Pingrup Rd and Bairstow Rd floodways. This information has been used for preliminary engineering design and route alignment of major valley floor surface water conveyance structures.

6.1.5 *Development of Rainfall – Runoff model*: A report establishing rainfall – runoff threshold parameters for the sub-catchments within the Lake Bryde Recovery Catchment was completed by URS engineers. This modelling has been used for preliminary surface water engineering design and will assist with development of eco-hydrology models and decision tools currently being undertaken by UWA – Centre for Water Research.

6.1.6 *EIA of surface water management proposals* – Actis Environmental were contracted to complete a revised EIA of proposed surface water management options as well as investigations of proposed route alignment of overflow from potential disposal lake within CALM purchase property (Roe loc. 3191). Further information is now available and a new contract has been established with Mattiske Consulting to investigate net impacts of the proposed surface water management options as described by Maunsell Australia Pty Ltd. This work is due to be completed in early 2005.

6.2 Administration of Purchase Property Reserve (↑47384) (Roe: 3191)

6.2.1 ***Tenure***: This land has been vested with the Conservation Commission as a 5(1)h reserve (↑47384) during the reporting period. The vesting is for purpose of conservation of flora & fauna, agriculture, trials & demonstrations, surface water flow management.

6.2.2 ***Tenancy***: An extension to the original short term tenancy agreement for the purchase property (Roe Location 3191) was signed on March 17 2004, providing the neighbouring landholder, Mr Rosenberg, with a one year tenure over the property. This agreement allowed for grazing and cropping of approx. 303 ha of the 730 ha property, excluding areas set aside for nature conservation and revegetation.

6.2.3 ***Revegetation***: No revegetation activities were undertaken on the property during 2004. The lessee returned the area of approximately 18 ha planted to oil mallees adjacent to Lakelands Nature Reserve, which failed to crop in 2004. The area surrounding the 12 ha *Acacia saligna* water use trial has been treated with herbicide during September 2004 to manage weed burden in the lead up to planting in winter 2006.

6.2.4 ***Trials***: The *Acacia saligna* water harvesting trial was monitored during 2004. Personnel from the Revegetation Systems Unit and Forest Products Commission recorded tree growth and soil moisture measurements.

6.2.5 ***Surface Water Management***: No surface water management works have been undertaken on the purchase property to date, however the extension of a shallow waterway from the 14 Mile Rd floodway is currently being negotiated with the Shire of Lake Grace and works are anticipated to commence in 2005.

6.2.6 ***Fencing***: Boundary and remnant vegetation fencing of the purchase property was partially completed during 2004. Approximately 8km of fencing was constructed during 2004, with 2km of boundary fencing to be completed during 2005.

6.3 Monitoring

6.3.1 ***Surface Water:*** The surface water monitoring program was reviewed and extended with the addition of 10 automatic depth flow gauges at strategic locations through the catchment. Data loggers have been downloaded by Department of Agriculture personnel and data is being processed by this agency. Low rainfall during 2004 has resulted in very minimal flows in various parts of the catchment, with no inflow to Lake Bryde. Ten more gauges will be installed during 2005 and manual monitoring protocols during flow events will be established to verify data colleted by automatic gauges.

6.3.2 ***Groundwater:*** Monthly monitoring of groundwater depths has been undertaken during 2004. A local resident has been employed on a casual basis to undertake monitoring of the 152 bores throughout the catchment. Groundwater pH and salinity have been recorded on a 6 monthly basis. Groundwater levels have generally decreased throughout the catchment during 2004, this is probably due to the low rainfall in the catchment and no significant flows to increase recharge.

6.3.3 ***EM 38 Survey:*** An EM 38 survey of major lakes and transects through major watercourse environments was initially undertaken during 2003 and again repeated during winter 2004. Results were converted to soil salinity measures and Arcview

shape-files developed describing soil salinity on the valley floor and wetland areas. There has been a slight increase in soil salinity since the first recording in 2003 in the Yate Swamp area and East Lake Bryde. All other areas show no change or a slight decrease in soil salinity during this period. This is most likely the result of a low rainfall and subsequent lack of movement of dissolved salts. Further surveys will continue over the lake beds and important areas across the valley floor in 2005 and following significant flow events. An EM38 survey of the entire CALM purchase block will also be undertaken during next winter and used for planning of revegetation activities on this block.

6.3.4 ***Vegetation Health:*** Multi-spectral Satellite imagery was obtained and analysed during summer 2004/2005. Imagery has been matched to previous imagery purchased for summer 2002/2003. There has been little change in greenness index over this period. This is most likely due to low rainfall over this period and a lack of water in the system, which would otherwise result in waterlogging, driving degradation of vegetation throughout the valley floor. Analysis of MSI following future significant flow events in the system will be useful to compare changes due to waterlogging / recharge after an event.

6.3.5 ***TEC:*** Permanent transects for monitoring the health of the TEC in Lake Bryde and East Lake Bryde were established in December 2003 and have been monitored during June and December 2004 also.

6.4 Cost sharing initiatives

6.4.1 ***Management***. A review of all previous cost sharing agreements was completed during 2004. All agreements have been filed and stored on MS Access and GIS database.

6.4.2 ***Remnant fencing***. Three remnant vegetation fencing projects for an area of approx. 208 ha were implemented during 2004. Payments of $30,772 for these 23.73 km of fencing projects were finalised during 2004. Cost of fencing construction which form the basis of cost share agreements were reviewed by Gavan Mullan (Wheatbelt Region Revegetation Officer) during February 2004.

6.4.3 ***Revegetation***: Approx. 26,000 oil mallee seedlings were planted during 2004, covering an area of 16.6 ha over three properties. Total payments for reveg cost shares for 2004 was $9,016.

6.4.4 ***Surface Water Management Earthworks***: Desk top planning for surface water management on private property has been completed for the majority of properties within the catchment. Cost share agreements were finalised with 5 landholders and works implemented during autumn 2004. Six dams with a total capacity of 31,000 m^3 and approximately 12km of conventional grade banks were constructed. Total cost share payments for surface water engineering works were $35,373.

Dam constructed on private property through cost share agreement

6.5 Construction

6.5.1 ***14 Mile Road***: Design of floodway and culverts for the crossing on 14 Mile road was agreed with the Shire of Lake Grace and an accurate costing provided in 2003. Works were undertaken during 2004 however not completed to specifications provided by CALM. The design of the floodway has been revised and additional work is to be undertaken during 2005.

6.6 Communication

6.6.1 ***Newsletters***: 1 Lake Bryde Recovery Catchment Newsletter was distributed during October 2004, outlining progress to date, future direction of the project and introducing new staff.

6.6.2 ***Displays***: Lake Bryde project management staff attended the 2004 Newdegate Field day and manned a display on Lake Bryde Recovery Catchment and cost share initiatives. Darren Coulson attended the 1st National Salinity Engineering Solutions Conference held in Perth, November 2004. A poster was displayed, outlining Salinity Management in the CALM's Wheatbelt Region.

7.0 Works Program 2005

7.1 Investigations

7.1.1 An Environmental Impact Assessment is currently underway to assess the net benefits of the Maunsell Australia Pty. Ltd surface water engineering proposal for the Lake Bryde Recovery Catchment. This will be completed during March 2005.

7.1.2 Edith Cowan University, School of Natural Sciences, have been engaged to undertake eco-hydrological studies of the Yate Swamp area within the Lake Bryde Reserve. This partnership agreement will investigate the hydrological requirements of the vegetation of the swamp and assist with surface water management decision making.

7.1.3 A catchment modelling decision making tool is currently being developed by Centre for Water Research at the University of WA. The Lake Bryde catchment will form the basis for development of this tool. It is anticipated that this can be modified to be developed as a decision making tool for other catchments during phase 2 of the partnership agreement between CALM and UWA.

7.2 Surface water engineering works

7.2.1 Detailed design of various stages of valley floor waterway will be undertaken following approvals for preliminary design. The design will be split into 6 separate components. Construction of various stages will be completed during 2005/06.

7.2.2 Private property surface water engineering management works will continue under cost share agreements. Priority will be given to those properties adjacent to valley floor bioassets. The majority of work will be undertaken on Roe loc. 2585 (Frank Oliver's property), with the intention of using this property as a demonstration site once completed.

7.2.3 Removal of previously installed broad based banks on private property within the 14 Mile Rd catchment will be undertaken during 2005. These banks were trialled for 2 years on two properties, they have found to be not suitable for the current farming practices on these properties or other properties within the recovery catchment.

7.2.4 Expansion of the downstream surface water drain of 14 Mile Rd floodway will be completed during 2005, an upgrade to the culvert structure under the new floodway will be investigated also. It is likely that a box culvert installation is required to obtain the required capacity to relieve waterlogging and recharge above the road in the event of a high intensity rainfall event.

7.3 Revegetation

7.3.1 Revegetation priorities for the greater catchment will be developed using the Ecoscape remnant vegetation reports as a basis.

7.3.2 A revegetation and management plan will be developed for the CALM purchase block (↑47384).

7.3.3 Site preparation will commence for revegetation of approximately 100 ha of this property during winter 2006. A comprehensive weed control programme will be implemented during 2005.

7.3.4 Guidelines for CALM owned revegetation equipment will be completed during 2005. Also arrangements to store and manage this machinery safely will be negotiated with landholders within the catchment.

7.4 Remnant Vegetation fencing

7.4.1 Revegetation priorities for the greater catchment will be developed using the Ecoscape remnant vegetation reports as a basis. Priority will be given to larger remnants over 10ha.

7.5 Monitoring

7.5.1 ***EM 38***: EM 38 Monitoring of major wetlands and cross sections of the valley floor will be undertaken again during 2005. A detailed EM38 survey of the entire CALM block (↑47384) will also be undertaken.

7.5.2 ***Surface water*** – manual recording and photographic recording will be undertaken in conjunction with downloading data from automatic gauges throughout the catchment.

7.5.3 ***Ground water***- monthly monitoring of water levels and 6 monthly monitoring of groundwater quality (salinity and pH) will continue during 2005.

7.5.4 ***Vegetation condition*** – permanent transects will be established at strategic locations throughout the valley floor. This will provide baseline data to document condition of valley floor vegetation and allow for comparisons to be made after surface water engineering structures are implemented.

7.5.5 ***TEC***: Continuation of monitoring program established for the TEC will provide a basis for quantifying the change in vegetation health, and provide a rigorous basis for comparing the health of the two remaining populations. Recruitment will be quantified and new individuals mapped within permanent plots, also the boundary of living populations will be measured and compared to mapping undertaken in 2003. Actions as described in the IRP are to be implemented during 2005, including further seed and cutting collection as well as population monitoring programs.

7.6 Cost Sharing

7.6.1 Cost sharing guidelines for surface water management engineering are to be revised. A greater priority and incentive may be given to those properties directly adjacent to CALM assets. A review of fencing material cost is currently being undertaken also, as material prices have increased significantly during the last 12 months.

7.6.2 Cost share arrangements for surface water management, remnant vegetation fencing and revegetation within the catchment will continue during 2005.