GOULBURN-MURRAY WATER

Katunga
Water Supply Protection Area
Groundwater Management Plan

Annual report for the year ending

30 June 2011

Foreword

This is the fifth annual report on the Groundwater Management Plan (the Plan) for the Katunga Water Supply Protection Area (WSPA), covering the period 1 July 2010 – 30 June 2011. The report summarises the Plan's performance over the year, including a review of groundwater use, trade, groundwater levels, compliance, metering activity and salinity data.

The Plan has continued to provide a robust management framework which has ensured that licence holders and stock and domestic users have retained access to a valuable groundwater resource throughout an extended drought. The return to wetter conditions in the last 12 months has resulted in a significant reduction in demand for groundwater, and has seen a corresponding recovery in groundwater levels. The reduction in use has ensured that allocations will remain at the maximum allowable level of 70% of entitlement in 2011/12.

It is a requirement of the Plan that, as a part of the fifth annual report, a review is undertaken of the Plan, and in particular its performance against management objectives. Goulburn-Murray Water has reviewed the Plan and a report describing the findings of this review has been submitted to DSE for its consideration. In the event that any amendments to the Plan are required, a process will need to be instigated to allow a Consultative Committee, appointed by the Minister for Water, to consider any changes.

This annual report will be submitted to the Minister for Water and the Goulburn Broken Catchment Management Authority and a notice of report availability will also be published in the Cobram Courier and the Numurkah Leader.

A copy of this report will also be available for inspection at the Cobram and Tatura offices of Goulburn-Murray Water (G-MW), on the G-MW website (www.g-mwater.com.au), or upon request.

I encourage all groundwater users in the Katunga WSPA to take the time to read this annual report.

Signed:

Shane McGrath
ACTING MANAGING DIRECTOR

Summary

The 2010/11 irrigation season was characterised by above average rainfall conditions. The rainfall for the period was 766 mm (Bureau of Meteorology (BOM) gauge 080109 at Cobram), compared to average annual rainfall for the area of 461.5 mm (BOM gauge 080109 at Cobram). The 2010/11 season saw an allocation of 70% announced for all zones. This resulted in 11,654.7 ML of metered usage (27.5% of the allocated volume of 42,350.7 ML). This is a significant decrease from the 2009/10 season which recorded 30,994 ML of usage. The extremely wet conditions in late 2010 and early 2011, corresponds with the 2010/11 irrigation season and are the main reason for the significant decline in groundwater usage.

There were two groundwater temporary trades in the 2010/11 season for a total volume of 217.5ML. This is less than 10% of the volume temporarily traded during the 2009/10 season which totalled 2915.5 ML. This change reflected the higher surface water availability and above average rainfall during the 2010/11 irrigation season.

A total of 587 ML of entitlement was traded via 5 permanent trades during the 2010/11. This is almost twice the volume permanently traded during the 2009/10 season (256 ML), due to two relatively large trades. Three new groundwater licences were created via permanent trade.

The annual salinity sample survey saw a total of 28 salinity samples returned from the 178 sample bottles that were sent out in January 2010, a return rate of 16%. This is slightly less than the return rate in previous years and is most likely a result of the reduction in groundwater usage for the period (with many bores not used).

Sixty-three new licenses were issued as part of the Dairy Shed Water Licence Transition Program, totalling (756 ML/year entitlement) and 22 licenses were amended to include dairy shed licence volumes (302.3 ML/year entitlement).

The Plan was scheduled for review by July 2011 as it has been five years since its approval. In addition, a review was triggered as the average groundwater recovery level was lower than the threshold outlined in section 6 of the plan. The review has been undertaken and submitted to DSE for consideration. If the recommendations of the review are endorsed by DSE then a consultative committee will need to be appointed to consider and amendments to the management plan.

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1 Description of the Water Supply Protection Area

1.1 Boundary

A Water Supply Protection Area (WSPA)[1] is declared under the *Water Act 1989* to protect groundwater resources. The Katunga WSPA was declared on 14 January 1999. It is located in the Murray and Goulburn Valleys, extending from just west of Yarrawonga to Barmah and from the River Murray to just south of Numurkah. It covers an area of approximately 2,100 km^2 and incorporates parts of the floodplains of the River Murray, Broken Creek and Goulburn River (Figure 1).

1.2 Land use

A large part of the WSPA is within the Murray Valley Irrigation Area, which is supplied with surface water from the Murray River through a network of channels. Pasture production for the dairy industry is predominant in the WSPA and is generally flood irrigated. A mixture of flood and pressure (drip or micro-spray) irrigation occurs in the limited horticultural areas in the north-eastern part of the WSPA.

1.3 Geology

The geology of the region consists of alluvial deposits overlying bedrock made up of Palaeozoic shale, siltstone and sandstone. The alluvial deposits are divided into three principal geological units:

- Shepparton Formation;
- Calivil Formation; and
- Renmark Group.

The Shepparton Formation overlies the Calivil Formation and the Renmark Group and forms the uppermost geological formation (usually 80 to 100 m thick) over most of the region. The Shepparton formation is comprised of clays, silts, sands and gravels. The relative amounts of silts, clays, sands and gravels varies greatly throughout the Shepparton formation which means that it performs better as an aquifer in some locations relative to other locations. This also causes the water quality (as salinity) to vary significantly throughout the Shepparton formation.

The Renmark Group and Calivil Formation are often considered to be one aquifer. The Calivil and Renmark deposits overlie the Paleozoic bedrock. They are made up of unconsolidated gravels and sands deposited by ancient rivers which once flowed from the highlands onto the plains, along broad valleys. In the riverine plains of Northern Victoria, the Renmark Group/ Calivil Formation forms three major aquifers (commonly referred to as “Deep Leads”). The deep leads generally follow the course of today’s Murray, Goulburn and Campaspe Rivers. These aquifers broaden toward the north and west and merge to form a continuous sheet under much of the south-eastern Murray Basin. In the eastern part of the WSPA, where the bedrock is closer to the land surface, the Renmark and Calivil formation deposits are around 15m thick and located at a depth of 50m below the surface. The deposits thicken westwards and are typically 80m thick in the centre of the WSPA, and around 100m below surface.

1.4 Overall management of the resource

The Katunga WSPA boundary has been set to manage groundwater resources at a depth of greater than 25 metres below the ground surface. While the groundwater resource is primarily the Murray Valley “Deep Lead” Aquifer system, high yields can also be obtained from parts of the lower Shepparton Formation aquifers. For management purposes the WSPA is divided into three zones, zone 1061, zone 1062 and zone 1063 (Figure 1).

The overlying upper Shepparton Formation (at depths less than 25 metres) also contains significant groundwater resources which are managed under the Shepparton Irrigation Region (SIR) WSPA Groundwater Management Plan.

[1] These areas have also previously been referred to as a Groundwater Supply Protection Area (GSPA)

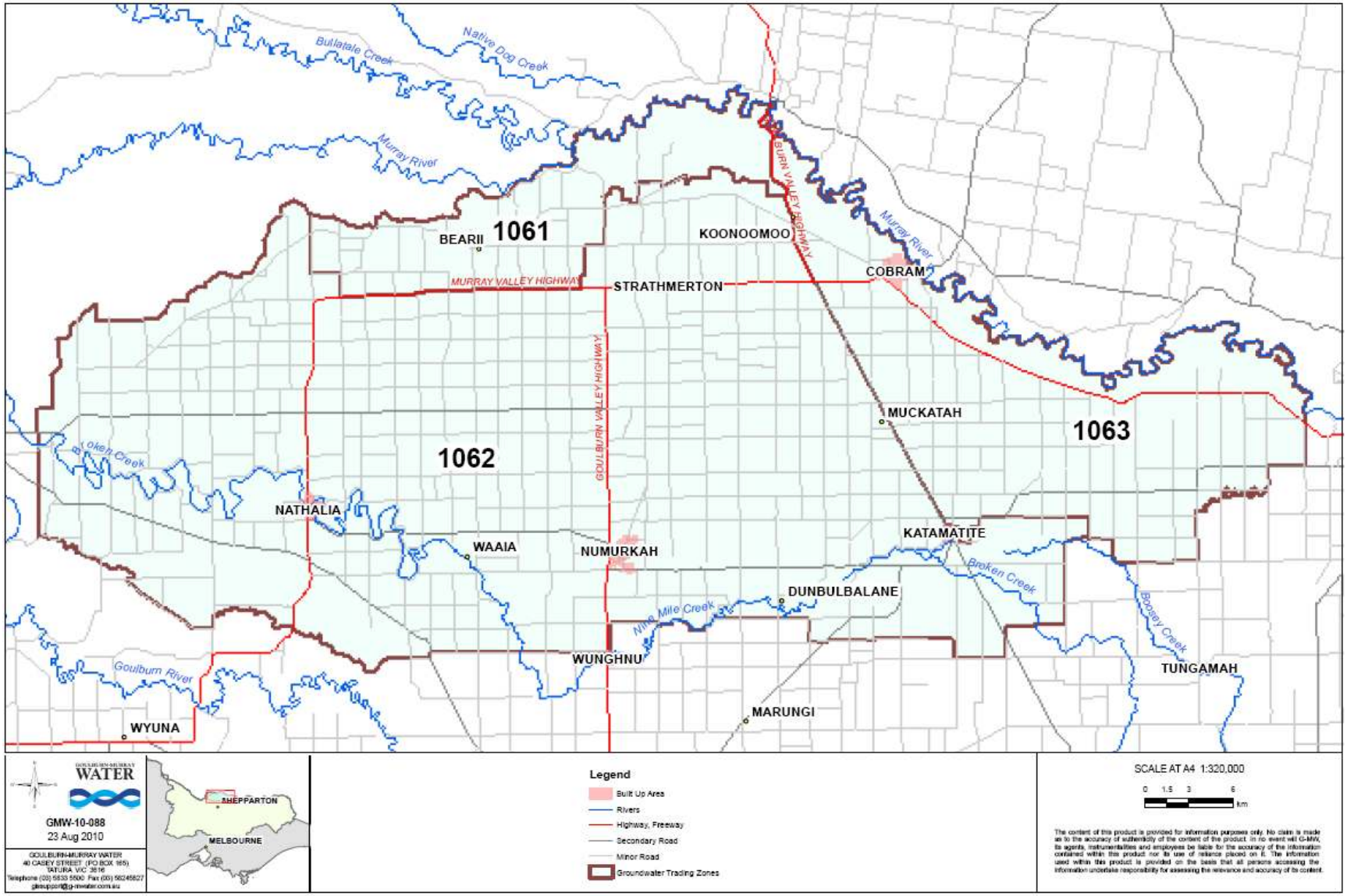


Figure 1 - Katunga WSPA boundary and management zones

2 Purpose of the Groundwater Management Plan

A Water Supply Protection Area (WSPA) for groundwater is declared when there is a large demand for water and when aquifer stress occurs; resulting in a more intensive management regime being required. When an area is declared a WSPA, a Groundwater Management Plan must be developed and implemented as specified in the *Water Act 1989* (the "Act"). The Katunga WSPA Groundwater Management Plan (the Plan) was approved by the Minister for Water on 24 July 2006. The Plan is scheduled for review every 5 years, with the first review due this year (July 2011).

The objective of the Plan is to make sure that the groundwater resources within the WSPA are managed in an equitable manner ensuring the long-term sustainability of those resources. There is a large volume of groundwater stored in the aquifers in the WSPA but extraction does affect groundwater levels. The Plan aims to use annual allocations to manage groundwater extraction to prevent groundwater levels from falling below, what many groundwater users consider to be, an acceptable level based on equity, accessibility and cost.

Licences are able to be transferred both permanently and temporarily to give licensees the flexibility to adjust their operations to changing circumstances.

A monitoring and metering program provides the information necessary to manage groundwater in the WSPA.

As explained in Section 1, the Katunga WSPA is overlaid by the Shepparton Irrigation Region WSPA which has its own management plan. Copies of the Plans and annual reports for both WSPAs are available on the G-MW website (www.g-mwater.com.au).

3 Plan implementation

3.1 Annual allocation

Prescription 3 of the Plan states that if the 5 year rolling average usage figure is greater than 30,000ML then the annual allocation is reduced to 50% of entitlement in the following year. If the 5 year rolling average usage is below 30,000 ML the allocation is set at 70% of entitlement.

The 2010/11 season saw an allocation of 70% announced for all zones.

The 5 year average usage for the period 1 July 2006 to 30 June 2011 was 27,230 ML (Figure 2), therefore an allocation of 70% has also been announced for the 2011/12 season in all management zones of the Katunga WSPA. The allocation was announced in a notice circulated in the "Shepparton News" on the 29 July 2011 and in the "Cobram Courier", "Yarrawonga Chronicle" and "Numurkah Leader" on the 6 July 2011. A media release was also distributed to media outlets in the region and all licensees were notified of the allocation.

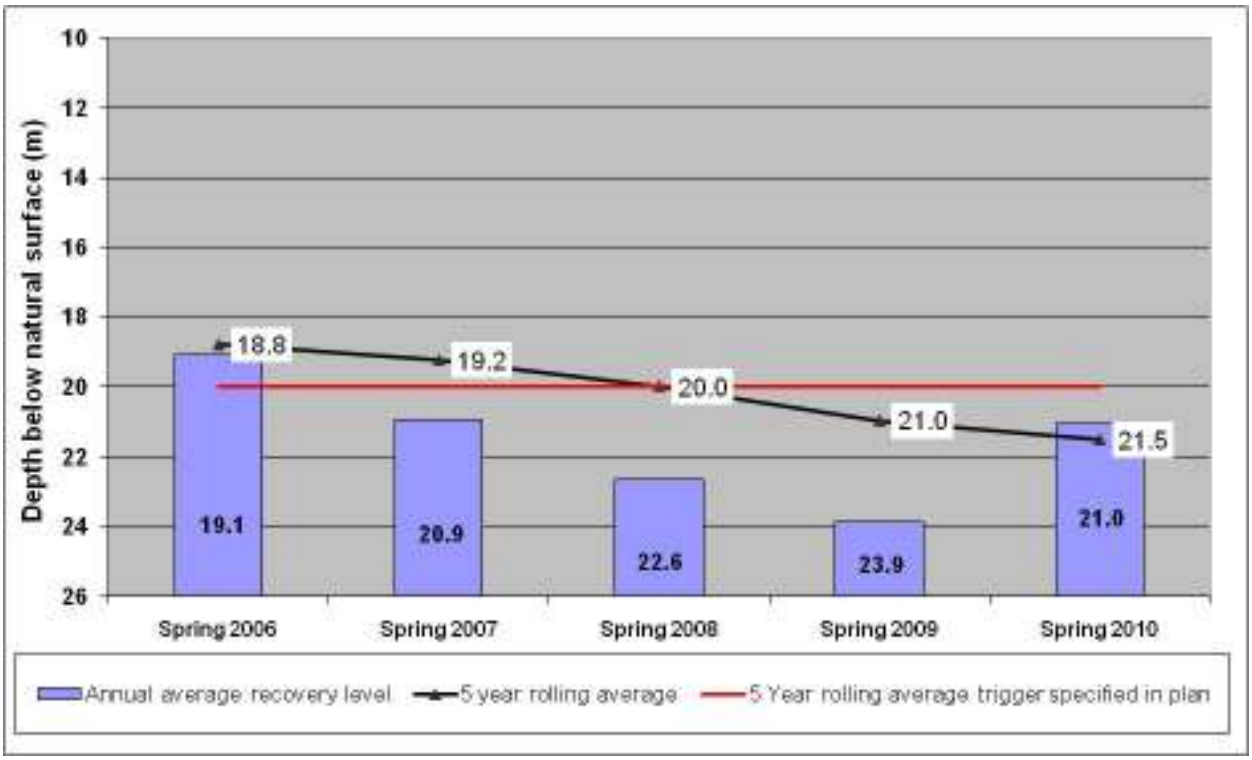


Figure 2 - The 5 year rolling average of usage

3.2 Usage

3.2.1 Usage volume

The majority of irrigation bores in the WSPA are metered (see section 3.6 of this report). The metered usage for the 2010/11 season was 11,654.70 ML (Table 1).

The location of all licensed (metered and un-metered) bores is shown in Figure 3 while the recorded 2010/11 usage for each extraction point (presented as a range) is shown in Figure 4.

Table 1 - Groundwater use in 2010/11 compared to the previous two years

Parameter	At 30 June 2009	At 30 June 2010	At 30 June 2011
Number of groundwater licences[2]	190	190	249 [3]
Total licence entitlement volume	59,538 ML	59,450 ML	60,503 ML [4]
Annual allocation	70 %	70%	70%
Total annual allocation volume	41,676 ML	41,615 ML	42350.7 ML
Number of metered bores	126	132	131
Total metered volume used	32,849 ML	30,994 ML	11654.7 ML
Total metered use as a percentage of total licence entitlement volume	55%	52%	19.3%
Total metered use as a percentage of total annual allocation volume	79%	74%	27.5%
Number of licences with estimated volumes	0	0	0
Total estimated volume used	0 ML	0 ML	0 ML
Total use	32,849 ML	30,994 ML	11654.7 ML

[2] Sole private rights and Domestic & Stock use is not included in this number

[3] Number of licences has increased mainly as a result of the issuing of dairy was licences

[4] Licence entitlement has increased due to the inclusion of dairy shed water licences. This total excludes three pending licences. Approval of these licences will bring total entitlement to 60,645 ML/year

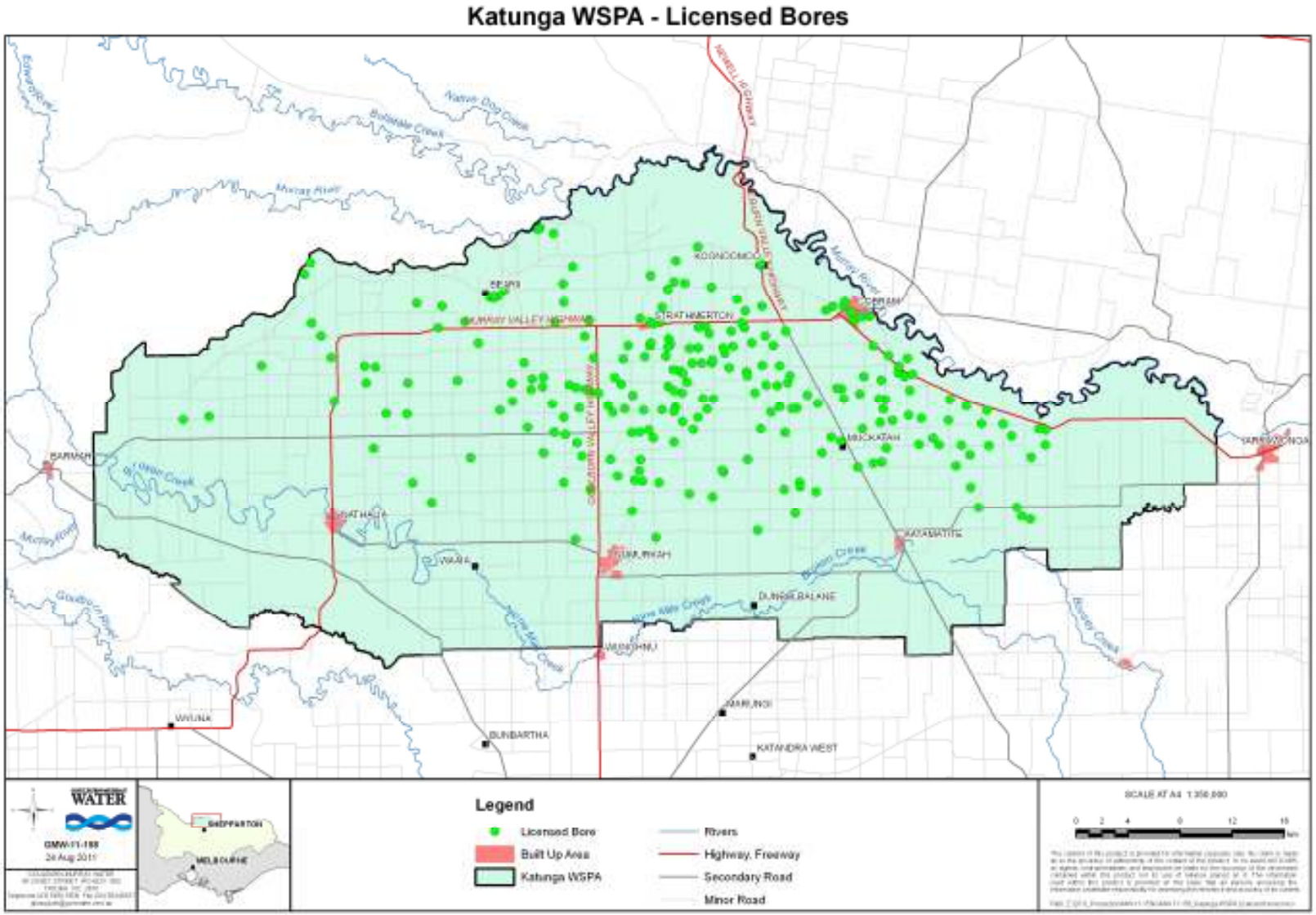


Figure 3 - Location of licensed bores within the Katunga WSPA

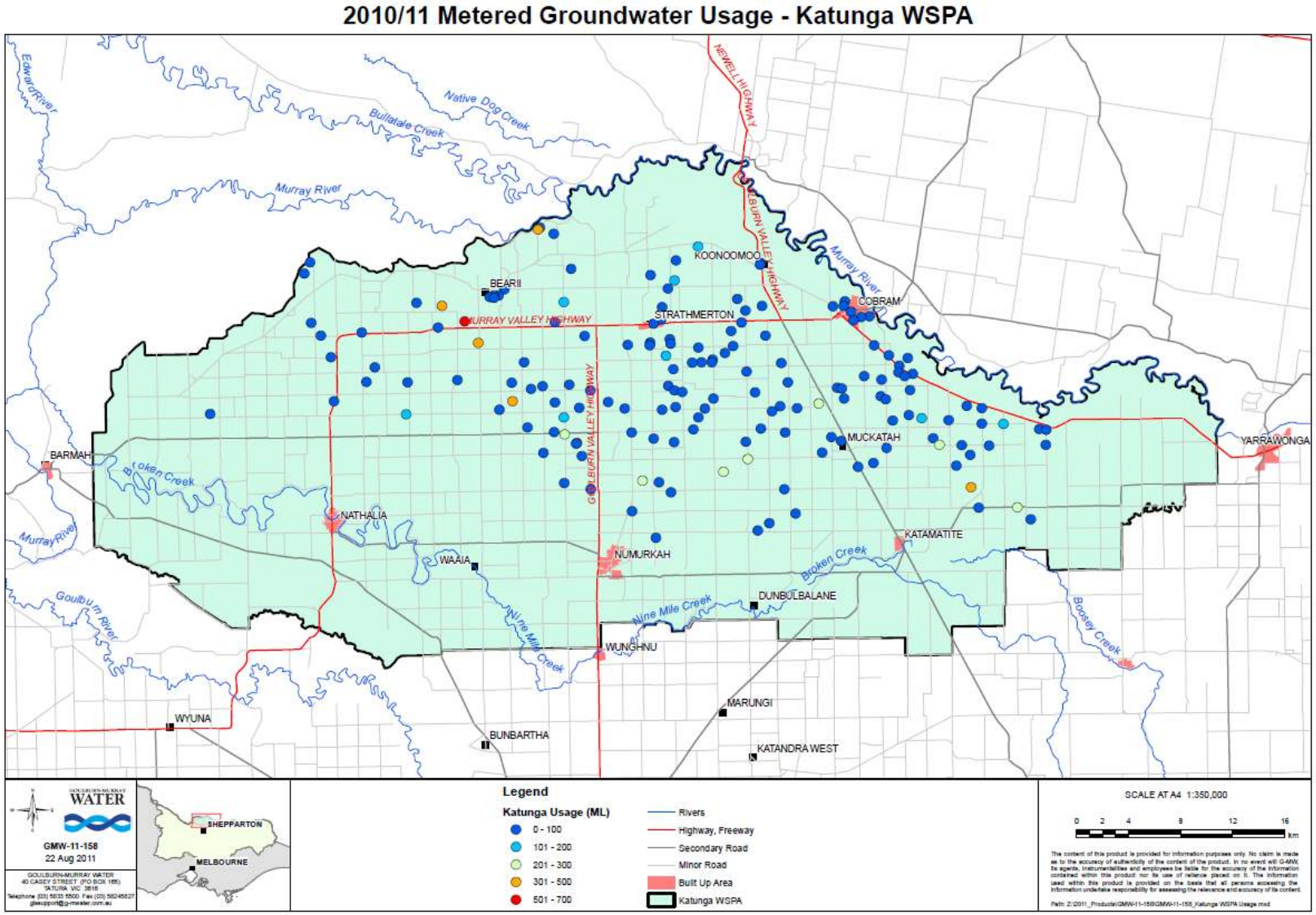


Figure 4 - Metered usage for individual extraction points

3.2.2 Factors affecting usage

The usage in the 2010/11 season was the lowest recorded since bores were metered. Over the past 13 years, usage has been over 20,000 ML each season. The low usage is the result of above average rainfall during the 2010/11 season which reduced irrigation demand and increased surface water availability for irrigation.

Figure 5 shows annual groundwater usage over the last 5 seasons with corresponding rainfall for each season. As shown in Table 2, the high rainfall occurred throughout the beginning and middle of the irrigation season. Table 3 shows that the 100% surface water allocation (high-reliability water shares) for the Murray surface water system occurred early in the season (15 October). Figure 6 shows the surface water availability over the past 5 seasons.

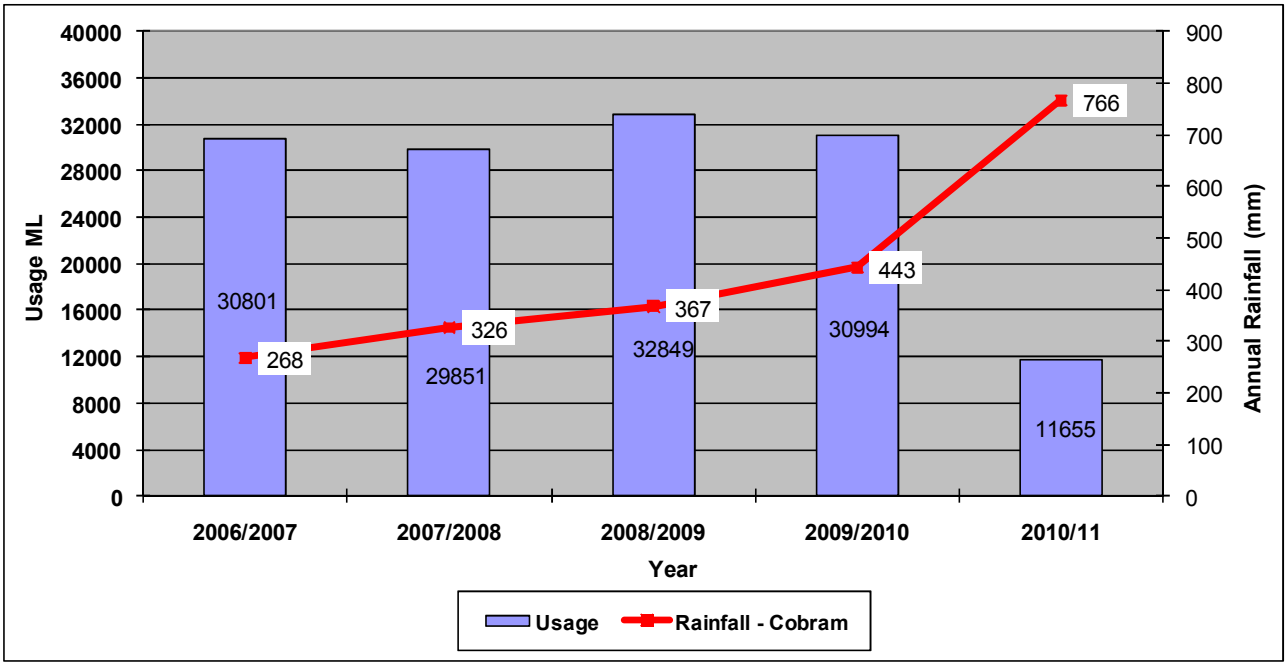


Figure 5 - Metered groundwater extraction for the Katunga WSPA compared with total season rainfall (1 July to 30 June) recorded at Bureau of Meteorology station at the Cobram Goulburn-Murray Water Office (BOM site 080109).

Table 2 - Rainfall distribution patterns for the last 3 irrigation seasons (July to June) recorded at Bureau of Meteorology station at the Cobram Goulburn-Murray Water Office (BOM site 080109).

Season	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
2008/09	51.2	19.4	19.2	8.2	89.8	79.6	0	0	5.6	28.8	24.2	41.4
2009/10	24.6	21.8	32.6	16.2	66.2	6.4	19.4	78.2	67	26.4	62.2	22
2010/11	31.8	70.4	66.4	144.6	40.8	n/a	101.4	175.6	56.4	45	16.8	17.2

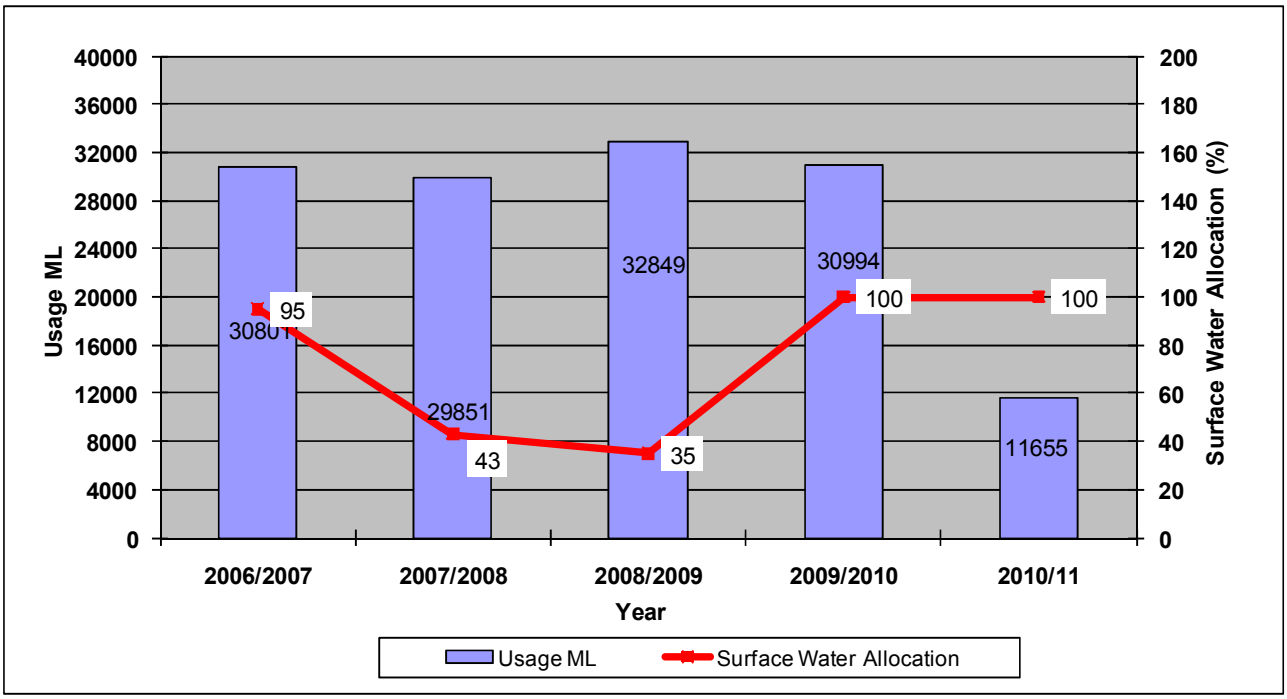


Figure 6 - Total metered groundwater extraction for the Katunga WSPA compared with final surface water allocations for the Murray system.

Table 3 – Timing of allocations increases for the Murray system during the 2010/2011 season

Date	Allocation
1 July 2010	0
15 July 2010	0
2 July 2010	2
16 August 2010	23
1 September 2010	57
15 September 2010	94
15 October 2010	97
15 October 2010	100

3.2.3 Overuse and compliance

The establishment of a dedicated compliance unit within G-MW has led to an improvement in the management of compliance issues across the G-MW region.

Identification and in-field monitoring of potentially high use bores occurred throughout the season. In addition Goulburn-Murray Water has continued with communication outlining licence holder obligations to maintain extractions within licensed entitlement, and the consequences of over use.

There were relatively few cases of non-compliance during the 2010/11 season. There were three cases of possible interference with meters and two alleged instances of groundwater being pumped in excess of licensed entitlement. Three cases are currently under investigation.

One case of overuse resulted in a successful prosecution in 2010/11.

Goulburn-Murray Water will continue to maintain its zero tolerance approach to non-compliance.

3.3 Groundwater levels

Groundwater levels across the WSPA are regularly measured in a network of observation bores (see section 3.7 of this report). Hydrographs of water levels in key bores in the various zones are presented in Appendix 1 – Representative Hydrographs[5]. Bores presented in Appendix 1 can be located on the map of monitoring bores in Figure 9.

Figure 7 shows that the 5-year rolling average annual groundwater recovery level (black line) and the annual recovery level for each of the last five seasons (purple column). Annual average recovery levels (measured in spring) have declined progressively in each year of the Plan and have been greater than 20 m below ground level for 4 out of the 5 years of the plan. The exception was the spring of 2010 when groundwater levels recovered to 21 m below ground surface. This is the first year the progressive decline in water levels has reversed and is the result of the significant reduction in groundwater pumping and wetter than average seasonal conditions in 2010/11.

However, while the annual recovery level increased in 2010, the 5-year average recovery level has continued to decline, from 21 m to 21.5 m below ground surface. This is because the spring 2010 recovery level is still lower than the 2005 level which was used in the calculation for the rolling average 5-year groundwater level in 2009.

As outlined by Prescription 1 to 3 of the Plan, the annual allocation announcement aims to prevent the 5-year average spring recovery groundwater levels falling greater than 20 m below the natural surface.

Based on an inferred relationship between usage and groundwater recovery level in the Plan, the 5 year average recovery level for a 5 year average usage of 30,000 ML should be 19 m below ground surface. The current level of 21.5 m below ground surface is 2.5 m below the predicted value. The relationship between groundwater use and groundwater level recovery has been considered further in the 5 year review of the Plan referred to in Section 4 of this report.

[5] *In the hydrographs, the water levels in some shallow bores (screened at a depth less than 25 m) are presented. These bores are in the SIR WSPA and not the Katunga WSPA but are presented to show the contrasting response to pumping, of the shallow Shepparton formation with the deeper Shepparton formation aquifers and the Calivil/Renmark aquifer.*

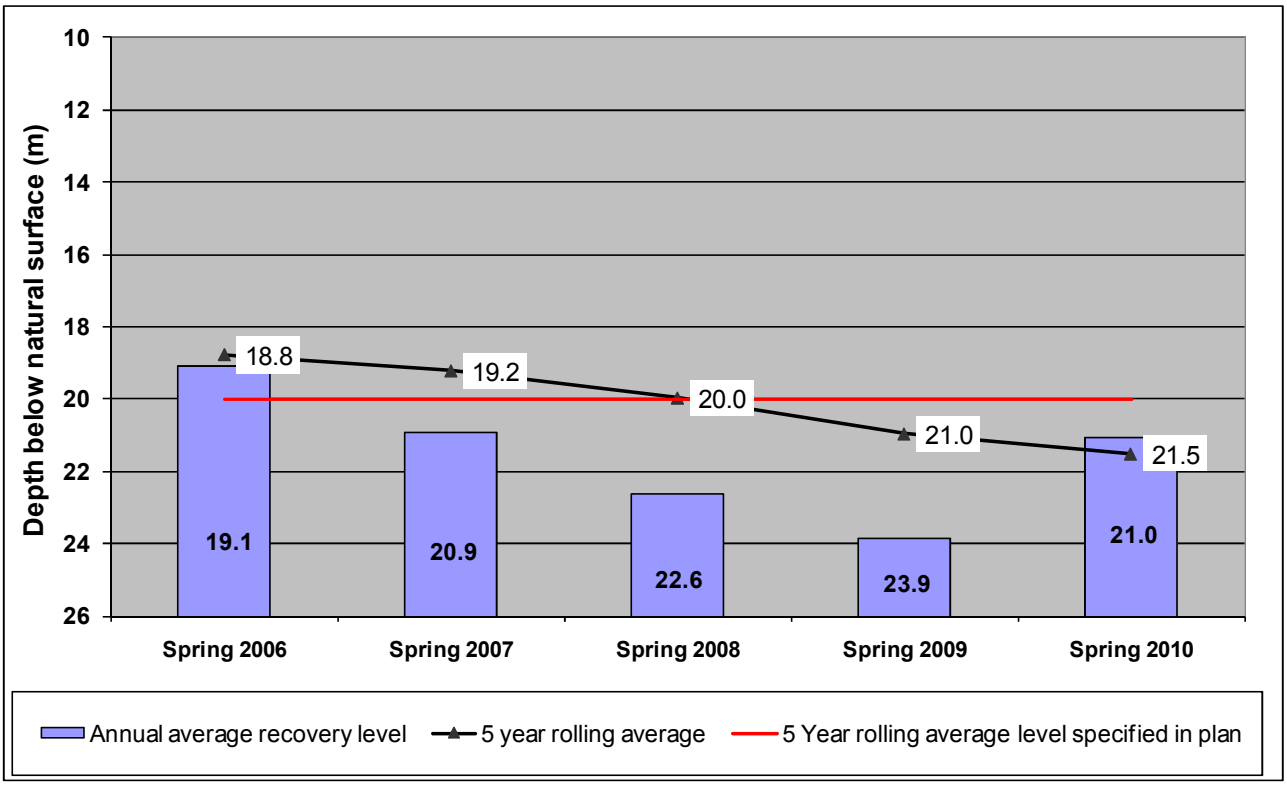


Figure 7 - Spring annual recovery levels compared with 5 year rolling average levels

3.4 Licence transfers

3.4.1 Temporary trading

Allowing licences to transfer from one person or business enterprise to another allows individuals to flexibly manage businesses depending on individual needs and circumstances. Temporary trading is allowed providing the requirements of Prescription 7 of the Plan are met.

The total amount of temporary trading for 2010/11 was 217.5 ML (two transfers). This volume was less than 10% of the previous year and reflects the higher surface water availability and wetter climatic conditions during the season, leading to less demand for irrigation. Figure 8 shows that the trades were from zone 1062 to 1063.

3.4.2 Permanent trading

Permanent licence transfers enable new licences to be issued to permit access to the groundwater resource. They are allowed provided they meet the requirements of prescriptions 8 to 10 of the Plan. To reduce the total groundwater licence entitlement in the WSPA over time, a permanent off-property transfer of a licence will be subject to adjustment of volumes on transfer whereby the individual licence entitlement will be reduced by 20%. For example a licence issued for 100 ML/year would be reduced to 80 ML/year when transferred.

The volume of permanently traded groundwater in 2010/1 was 587 ML (5 applications). Figure 8 shows that the trades occurred within zone 1062 and from zone 1062 to zone 1063.

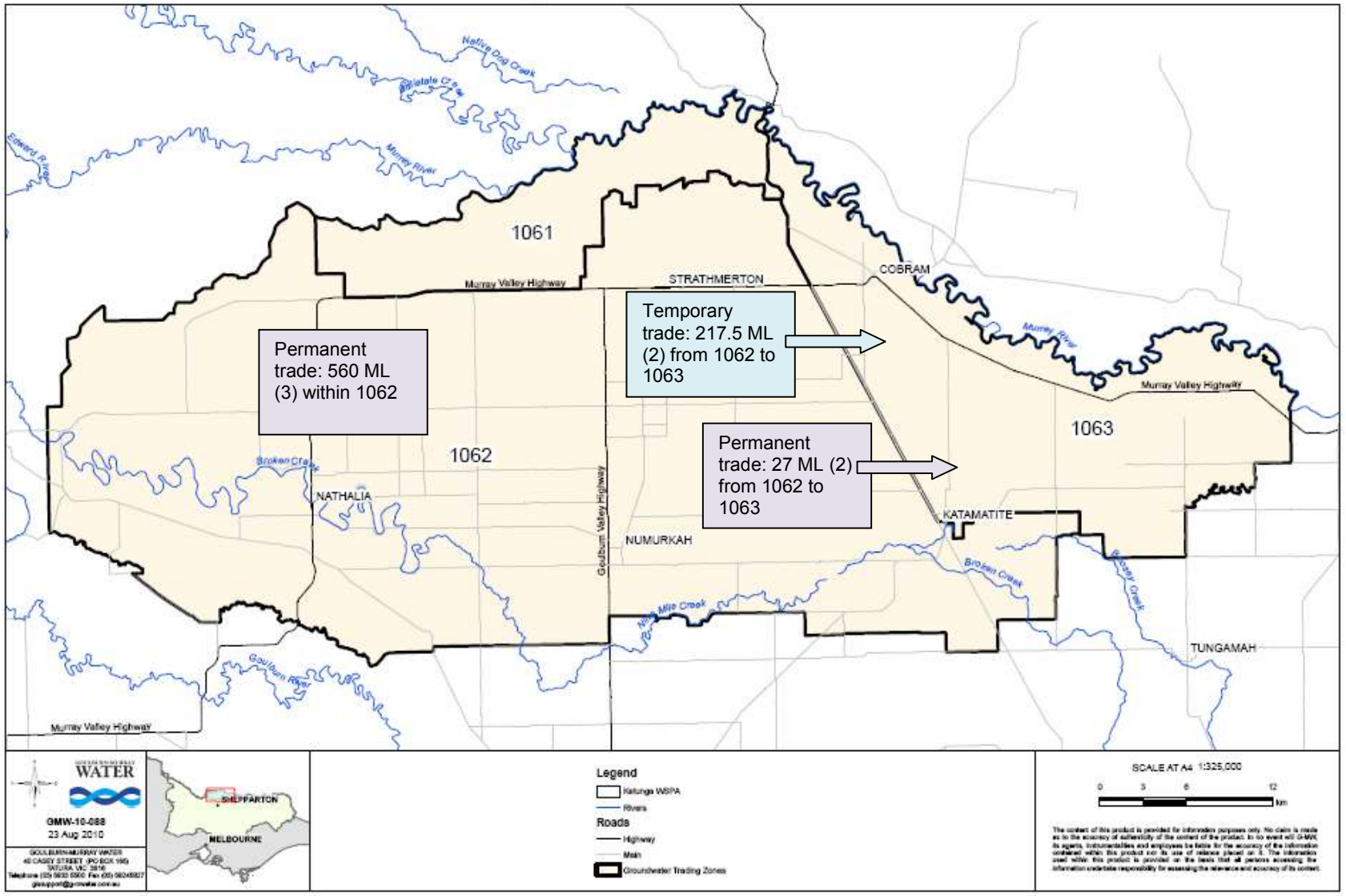


Figure 8 - The volume and number (in brackets) of temporary and permanent transfers within and between management zones.

3.5 Licensing activities

G-MW must manage licence entitlement in the Katunga WSPA in accordance with prescriptions 11 to 18 of the Plan. Details of licensing activities in 2010/11 are summarised in Table 4. No new licence entitlement is permitted to be issued in the Katunga WSPA as a Permissible Consumptive Volume (PCV) has been set. For administration purposes however, new groundwater licences may be issued to allow for groundwater trading, licence amalgamation or division. During the 2010/11 season, new groundwater licences were also issued as part of the Dairy Shed Water Licence Transition Program which was allowed in accordance with prescriptions 16 and 17 of the Plan.

Table 4 - Licensing activities for 2010/11

Activity	No.
New licences issued via permanent trade	3
New licences issued under Dairy Shed Water Licence Transition Program	63
Licences revoked	0
Licence cancellations	4
Licence amalgamations	1

All operating dairies are now required to have a section 51 licence for the commercial use of water in the dairy. The Dairy Shed Water Licence Transition Program operated during the 2009/10 and 2010/11 irrigation seasons and aimed to ensure that licence volumes reflect the historic use of water within dairies. Sixty-three new licences were issued under the Dairy Shed Water Licence Transition Program, totalling 756 ML/year of entitlement. Twenty-two licences were amended to include dairy wash volumes, a total of 302.3 ML/year of entitlement. Total new entitlement is 1058.3 ML/year.

The Katunga WSPA Groundwater Management Plan stipulates a PCV of 59,780 ML/year. For the purpose of fulfilling the objectives of the Dairy Shed Water Licence Transition Program order dairy shed licences were issued in excess of PCV . This was made possible due to a recent PCV order which expressly permits entitlement being issued in excess of PCV if it is for the purposes of issuing a licence under the Dairy Shed Water Licence Transition Program (Vic. Govt. Gazette G2814, July 2011, p1639). Total entitlement volume including the 2010/2011 dairy shed licence volumes is 60,503.70 ML/year. There are three dairy shed licence applications pending review. Approval of these will bring the total entitlement volume in the Katunga WSPA to 60,645 ML/year.

3.6 Metering

3.6.1 Meter Readings

Metering of groundwater use enables better management of the resource by providing vital information on the extraction point location and volume of water used, and comparing this to groundwater level responses. This enables sustainable management of the resource such that the resource can be shared equitably and ensures licensees extract within their annual allocation

volumes. Metering can also provide benefits to farming operations and can lead to efficiency of water use. Prescriptions 19 and 25 set out the requirements under the Plan in relation to installation, maintenance and reading of meters.

Under the requirements of the Plan, all existing irrigation and commercial use for groundwater licences that authorise the use of groundwater for 20 ML/year or more must be metered. In addition, all new licences are to be metered irrespective of the amount of groundwater licensed to be extracted.

Meters are read at least three times during the season, generally in November, March and May/June. Metered usage for each bore was calculated by subtracting the start meter reading from the end of season reading. All metered usage was verified.

3.6.2 Data storage

For effective management of the groundwater resource, data management systems are required to allow the storage, retrieval, analysis and reporting of large quantities of data. Metering data is stored and maintained by G-MW using the Irrigation Planning Module database.

3.6.3 Meter installation and maintenance

The condition of meters was noted when readings were taken. Twelve meters required maintenance, nine meters were replaced and one new meter was installed during the 2010/11 period.

Table 5 - Meter installation and maintenance activities 2009/10

Activity	Total at 30 June 2009	Total at 30 June 2010	Total at 30 June 2011
Number of new meters installed	0	3	1
Meters requiring maintenance	5	6	12
Meters replaced	14	1	8

3.7 Groundwater level monitoring

3.7.1 Monitoring sites

Monitoring of groundwater levels provides information to enable sustainable allocation and management of the resource. Observation bores provide information to:

- assess annual and long term impacts on water levels from groundwater pumping;
- monitor regional and local seasonal drawdown;
- examine relationships between aquifers;
- provide information for future resource assessments; and
- assess potential management issues.

The Plan requires groundwater levels to be monitored in 52 State Observation Bores (specified in Schedule 2 and 3).

Goulburn-Murray Water has been coordinating a Department of Sustainability and Environment (DSE) funded State Observation Bore Network Refurbishment Program (SOBN). Four new SOBN bores were drilled at two sites in the Katamatite and Katamatite East area. One of these sites includes three bores which screen at various depth intervals. This site will add to the understanding of the relationships between aquifers in the Katunga WSPA. These bores address the recommendations of the plan (page 16) and have increased the understanding of the depth and location of the Murray Trench.

The locations of Schedule 2 and 3 monitoring bores and the newly drilled bores are shown in Figure 9.

3.7.2 Level readings

The monitoring of observation bores continued in 2010/11 according to the requirements of prescriptions 26 to 28 of the Plan. A sub-contractor monitored the potentiometric levels in each bore specified in Schedule 2 (7 bores[6]) on a quarterly basis (Feb, May, Aug, Nov) for DSE and on behalf of G-MW for every other month of the year (totalling 12 readings per year). They also monitored the levels for each bore specified in Schedule 3 (44 bores) quarterly on behalf of G-MW.

Representative bores are presented in Appendix 1. The interpreted geology for bores 69547, 69545 and 53673 has been altered as recommended by recent work in the area (Macumber, 2011).

Water levels monitored in bores screened in the deep lead aquifer indicate a long term downward trend relative to levels recorded at the beginning of the record[7]. This trend reflects the development of groundwater based irrigation over the period on record. These bores also show strong seasonal variation in response to pumping. Levels recorded over 2010/11 indicate a slight upward trend towards the end of the 2010/11 season. This is the result of the reduced pumping and significantly wetter seasonal conditions in the 2010/11 irrigation season.

3.7.3 Data storage

As discussed in section 3.6.1 of this report, databases are required for the storage and retrieval of collected data to enable analysis and reporting. Groundwater level monitoring data is stored in the Groundwater Management System (GMS). This state-wide database is managed by the Department of Sustainability and Environment (DSE). Groundwater levels for all bores are entered into this database within 30 days of measurement so that the data can be accessed and interpreted.

3.7.4 Maintenance program

Bores are visually inspected during monitoring and any maintenance required is noted. During the reporting period, no long-term maintenance issues were identified. Maintenance such as painting the bores or clearing the site is undertaken by the sub-contractor as required. The hydrographs for each monitoring bore have been reviewed and no anomalies in data obtained during 2010/11 have been identified.

[6] Schedule 2 of the plan identifies that 8 bores will be monitored on a monthly basis. In 2009 one of these bores, bore 109680 was decommissioned due to poor performance. Therefore, only 7 bores are monitored on a monthly basis.
[7] The beginning of the period of record for the monitored schedule 2 and schedule 3 bores varies between 1974 and 1988

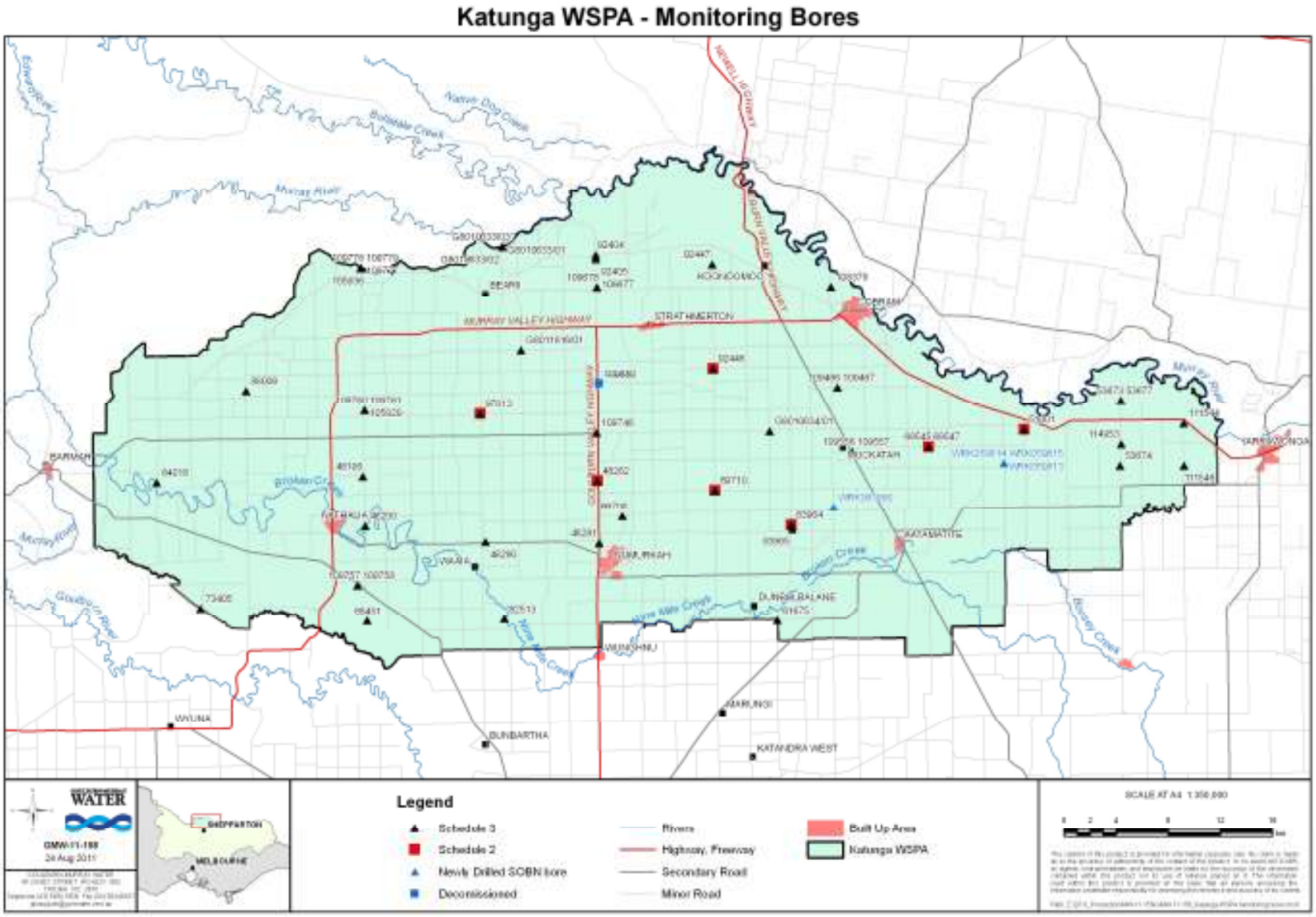


Figure 9 - Location of monitoring bores

3.8 Salinity monitoring

3.8.1 Monitoring program

Regular analysis of groundwater salinity is required so that any emerging salinity issues can be identified. Prescription 29 of the Plan requires that G-MW conducts a salinity sample mail-out to customers once a year. G-MW conducted the salinity mail-out in January 2011. A sample bottle was sent to every licence holder, along with a pre-paid return envelope and a letter requesting that a groundwater sample be collected during operation of the bore, and returned to G-MW for salinity determination.

Domestic and stock groundwater users are also encouraged to submit a salinity sample from their groundwater bore, however in accordance with the Plan, they must contact G-MW to register their interest and be supplied with a sample bottle.

3.8.2 Results

Sample bottles and letters were sent to the owners of 178 licensed bores and a total of 28 samples (16%) were returned between January 2011 and June 2011. The return rate during the 2009/10 season was 23.6%.

This is a significant reduction in sample return. A return rate of 23-35% is typical for most years. The 2010/11 mailout coincided with a period of significantly higher than average rainfall and therefore many bores are likely not have been used during this period, explaining the reduction in sample return.

The review of the Plan has considered the performance of the salinity mailout program. It is likely that amendments to the Plan will include improvements to the way groundwater salinity information is collected.

The spatial distribution of groundwater salinity sample results returned in 2010/11 is presented in Figure 10. Due to the poor sample return, it is not possible to draw detailed conclusions about salinity in the area. Salinity values recorded have not changed significantly from those recorded in the 2009/10 season and there continues to be no evidence to suggest that salinity levels are changing significantly in the Calivil and Lower Shepparton Formation aquifers. Groundwater salinities within the Calivil and Lower Shepparton Formation aquifers are generally lowest in the central and eastern parts of the WSPA.

Results of the salinity mail-out are recorded in the GMS Database.

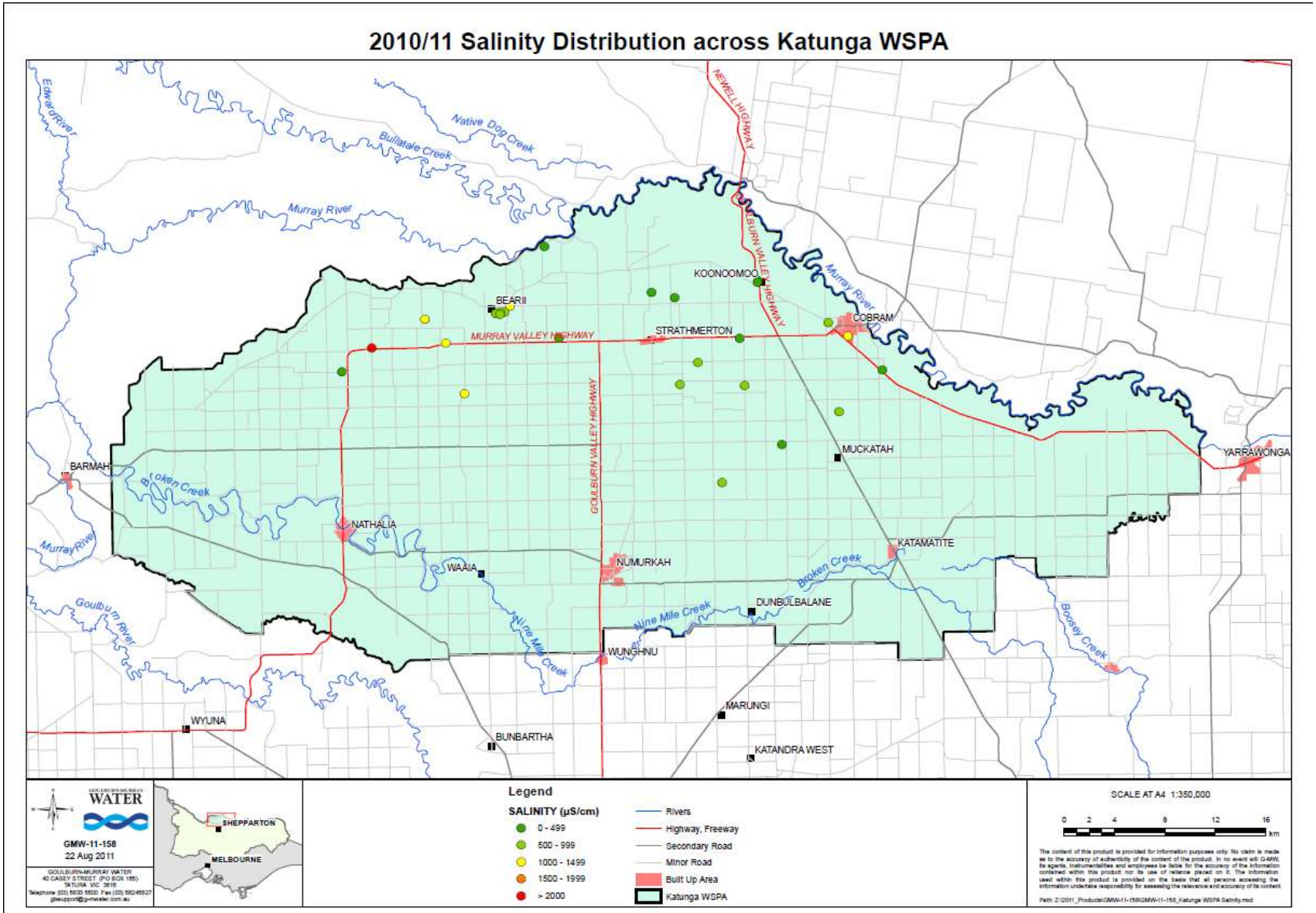


Figure 10 – Distribution and EC range of returned groundwater salinity samples from licensed bores in Katunga WSPA

4 Future considerations

4.1 Katunga WSPA Groundwater Management Plan Review

The Plan was scheduled for a review by July 2011. In addition to the need for a 5-year review as section 12 of the Plan, the disparity between the average level/ average use relationship outlined in section 6 of the Plan; and the actual observed groundwater level trend, further supports the need for a review to be undertaken.

A review of the Plan has been undertaken by G-MW and has considered management area and zone boundaries; allocation methodology; trading rules; carryover; groundwater monitoring and metering; and salinity monitoring arrangements.

The review has been forwarded to DSE for its consideration. Pending agreement between DSE and G-MW that changes are necessary, G-MW will seek the appointment of a consultative committee to consider making amendments to the Plan.

4.2 Katunga Customer Survey

In June 2011, customers were invited to provide feedback on how groundwater is managed in the Katunga WSPA. This survey was an important component of the recently completed review of the Plan. An irrigation customer survey was mailed to 185 licence holders in June 2011, and also placed on the G-MW website. A separate domestic and stock groundwater user customer survey was also placed on the G-MW website. Two press releases and public notices in local newspapers were undertaken to create awareness of the surveys.

Thirty-seven responses were received to the irrigation survey (20% return rate). No responses were received to the domestic and stock user survey.

The results of the customer survey have been reported in the review of the Plan.

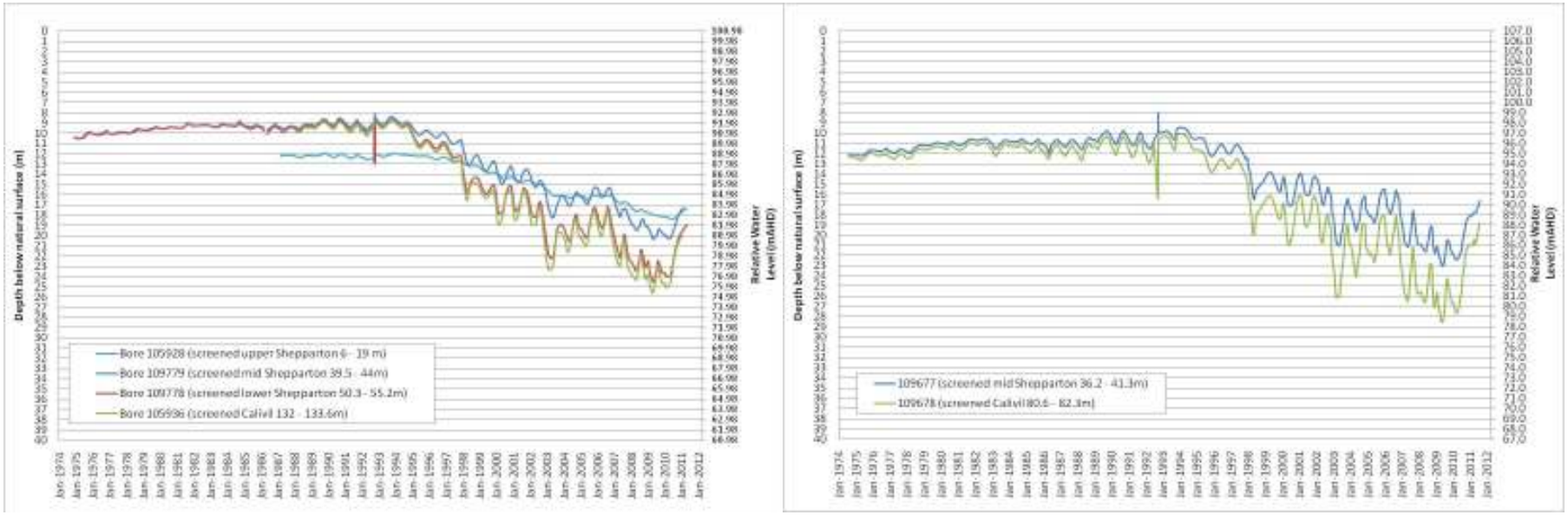
4.3 Data storage

Continuing improvement of information management systems is being undertaken within G-MW. These improvements will aid in the representation of information in a geographical context, and allow better management of resources. The streamlining of these databases will aid projects such as resource appraisals in collating known information about areas.

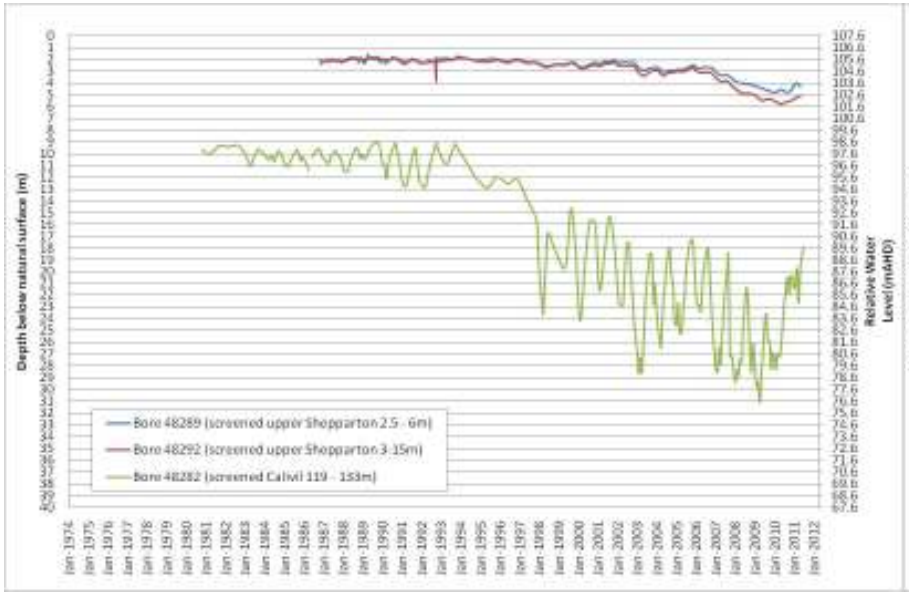
On a state-wide level, there are other data storage projects underway. The Water Management Information System (WMIS) will incorporate data from the GMS and the Victorian Data Warehouse. The data from this state-wide system will then be incorporated into the National Groundwater Information System (NGIS), which is being developed by the Bureau of Meteorology to manage groundwater information at a national level.

Appendix 1 – Representative Hydrographs

a) Zone 1061

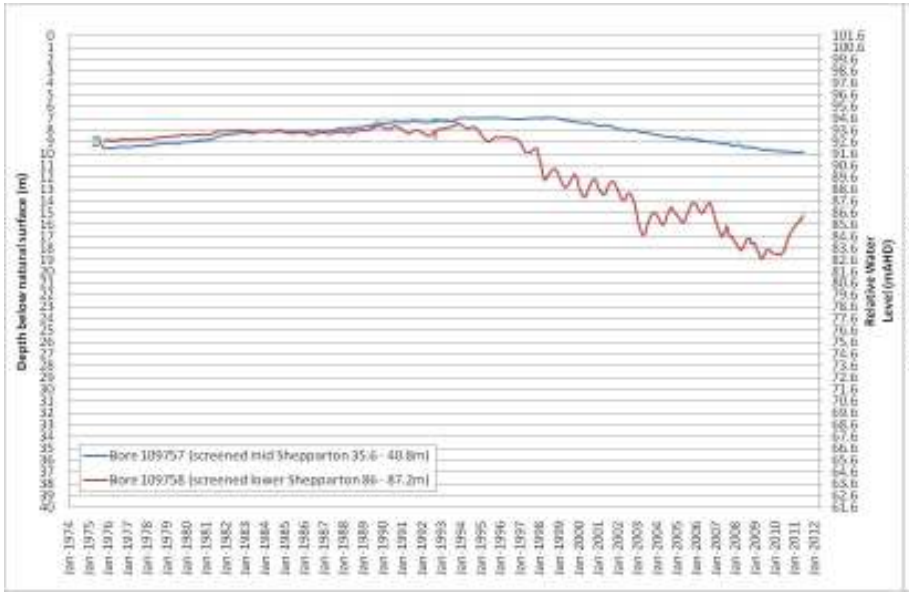


b) Zone 1062

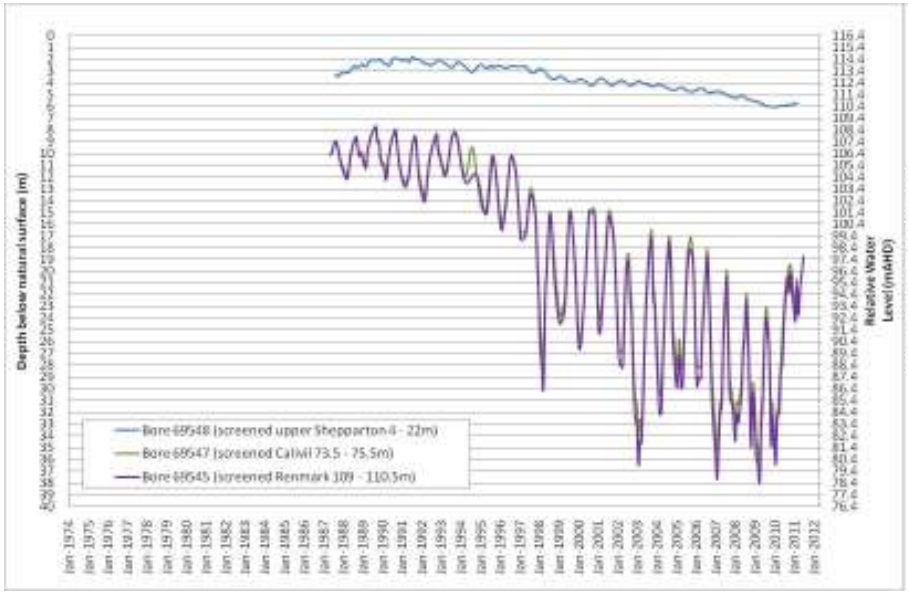

Depth below natural surface (m)
Relative Water Level (mAHD)
Bore 48289 (screened upper Shepparton 2.5 - 6m)
Bore 48292 (screened upper Shepparton 3.15m)
Bore 48282 (screened Calivil 119 - 153m)

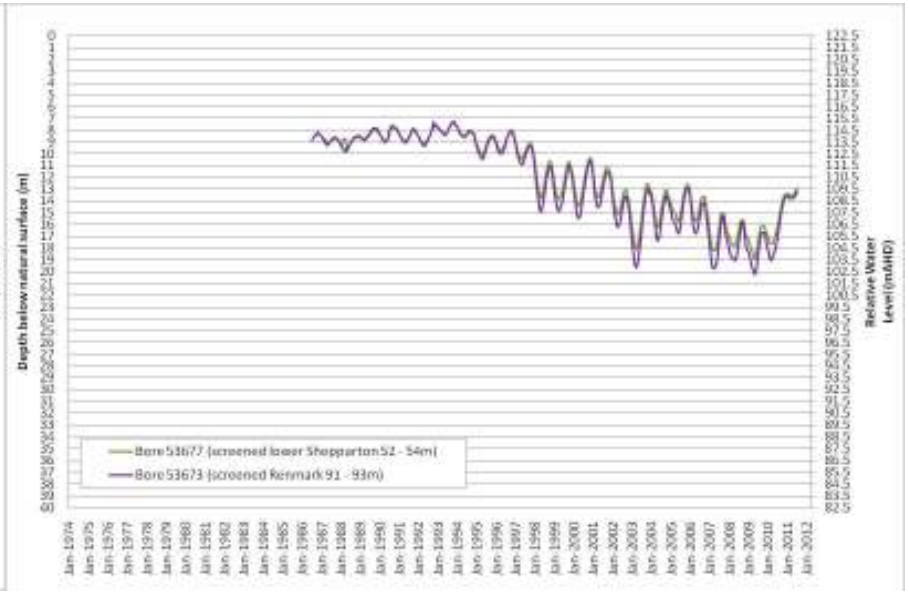

Depth below natural surface (m)
Relative Water Level (mAHD)
Bore 92447 (screened lower Shepparton 17 - 29m)
Bore 92446 (screened Calivil 134 - 135.5m)

Zone 1062 cont…



c) Zone 1063


Depth below natural surface (m)
Relative Water Level (mAHD)
Bore 69548 (screened upper Shepparton 4 - 22m)
Bore 69547 (screened Calivil 73.5 - 75.5m)
Bore 69545 (screened Renmark 109 - 110.5m)


Depth below natural surface (m)
Relative Water Level (mAHD)
Bore 53677 (screened lower Shepparton 52 - 54m)
Bore 53673 (screened Renmark 91 - 93m)