GWMWater

West Wimmera Groundwater Management Area

Annual Report 2022-23

EXECUTIVE SUMMARY

The West Wimmera Local Management Plan (LMP) 2019 is the primary reference document for groundwater management in the West Wimmera area and can be found on the GWMWater website www.gwmwater.org.au/WW-GMA. The LMP draws together the local management rules from the 2011 West Wimmera Groundwater Management Strategy and updated information relevant to groundwater management decisions in the area.

This report details GWMWater's activities in administering the LMP for the West Wimmera Groundwater Management Area during the period 1 July 2022 to 30 June 2023. It also can be found on the website www.gwmwater.org.au.

Status of the Groundwater Resource

Groundwater levels and extraction are monitored in the West Wimmera Groundwater Management Area (GMA) as outlined in the Local Management Plan. The data indicates that groundwater levels are responding to the level of extraction as expected. Where groundwater extraction is more intensive such as Neuarpur there has been a decline in groundwater level, while where extraction is more disperse, groundwater levels are generally stable. The rate of decline in groundwater level in Neuarpur is less than previously observed, while in the Yanipy sub-zone groundwater levels have stabilised returning to levels observed eight years ago.

Groundwater salinity remains stable based on samples obtained.

Groundwater extraction and use

A total volume of 12,244 megalitres (ML) was extracted from the Tertiary Limestone Aquifer in 2022/23 due to above average late spring rainfall and less area under irrigation. The volume extracted was less than quarter of the total licensed volume in the GMA and the least volume extracted in more than ten years. The average annual volume extracted for the previous ten year period was 22,632 ML.

All licences in Neuarpur Sub-zone 1 were restricted to 80% of entitlement in 2022/23. This restriction level will also remain for season 2023/24.

GWMWater has established a capital price for the available unallocated groundwater in the Northern, Gymbowen and Southern Zones (Edenhope and Ullswater Sub-zone).

Five year technical review (2023)

A further technical review of the West Wimmera GMA will commence in 2023/24. The review will examine the monitoring data (levels, extraction, water quality and climate), monitoring network, effectiveness of restrictions and the groundwater management arrangements. The review is anticipated to be finalised by April 2024.

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1. Introduction

The West Wimmera Groundwater Management Area (GMA) Local Management Plan (LMP) provides the framework to manage groundwater resources in the GMA with the objective to ensure the groundwater resource is managed in an equitable manner to achieve the long-term sustainability of the resource and maintain the social, environmental and economic benefits that groundwater provides to the region. This report provides a summary of licence information, usage and monitoring undertaken during the period 1 July 2022 to 30 June 2023.

The West Wimmera GMA is underlain by three main aquifers which vary in thickness, yield and water quality. The Tertiary Limestone Aquifer (TLA) is the primary source for stock and domestic, irrigation and town water across the area and the focus for management.

Management zones (Figure 1) have been established within the GMA based on hydrogeology, the management objective (stable groundwater trends) or other distinguishing characteristic, such as intensity of licences and extractions. The zones are Big Desert, Northern (including Yanipy sub-zone), Little Desert, Neuarpur Zone (sub-zones 1 and 2), Gymbowen, and Southern, with sub-zones Apsley, Langkoop, Edenhope and Ullswater.

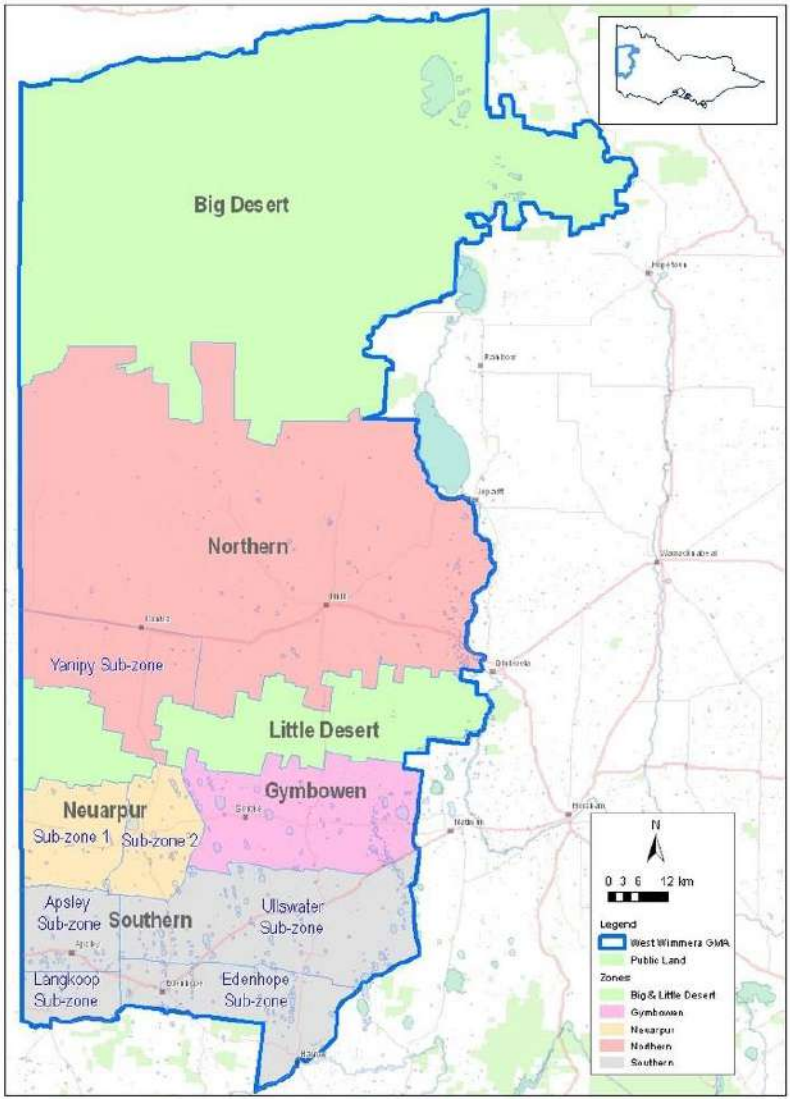


Figure 1: Management Zones of the West Wimmera GMA

2. Groundwater Management

2.1. Entitlement Limits

The Minister for Water has declared the Permissible Consumptive Volume (PCV) for the West Wimmera GMA as outlined in Table 1. The PCV sets limits on the total volumes that can be taken annually under a Take and Use Licence. While all aquifers have a PCV, all licenced extraction in the West Wimmera GMA is from the Tertiary Limestone Aquifer.

Table 1: Permissible Consumptive Volume (PCV) for all aquifers

West Wimmera GMA Zone or Sub-zone	Pliocene Sands Aquifer PCV in ML	Tertiary Limestone Aquifer PCV in ML	Tertiary Confined Sand Aquifer PCV in ML	All other formations PCV in ML
Big Desert Zone	0	25	0	0
Gymbowen Zone	50	2,000	200	0
Little Desert Zone	0	25	0	0
Neuarpur Zone				
• Neuarpur Sub-zone 1	0	20,700	200	0
• Neuarpur Sub-zone 2	0	4,050	200	0
Northern Zone	50	22,390	500	0
• Yanipy Sub-zone		(6,103*)		
Southern Zone				
• Apsley Sub-zone	0	2,901	200	0
• Edenhope Sub-zone	50	680	50	0
• Langkoop Sub-zone	0	2,000	100	0
• Ullswater Sub-zone	50	888	100	0

*the PCV for Yanipy Sub-zone is included in the overall Northern Zone PCV

2.2. Licensed volume

A summary of licensed volume in the West Wimmera GMA is outlined in Table 2. Further detailed information may be obtained from the Victorian Water Register http://waterregister.vic.gov.au/.

Table 2: Summary of Licences as at 30 June 2023

Management Zone	Number of Licences	Licensed volume (ML)	Comment
Neuarpur	*45*	*24,691*	
Northern	*68*	*21,957*	*10ML licence not renewed*
Southern	*36*	*5,630*	*15ML licence issued*
Gymbowen	*11*	*1,052*	
Total	***160***	***53,330***	

2.3. Groundwater use

Each irrigation bore and active commercial bore is fitted with a meter approved by GWMWater. Groundwater users are encouraged to actively monitor their extraction volume throughout the season and report any meter error or malfunction to GWMWater.

In most cases meter reading and water use audits are undertaken twice yearly, once in January/February (mid-irrigation season) with end of season readings taken in May/June. Bores used for extraction of water for domestic and stock purposes are not metered.

Licensees must secure water from another licence holder by way of trade or transfer should they require any volume of water in addition to their licence volume during the season. Any such trade or transfer must be approved by GWMWater prior to the taking of additional water volumes.

This year (2022/23), 89 of the 160 licences were active and extracted a total volume of 12,244 ML (see Table 3 for use by zone). Extraction for irrigation and commercial purposes accounted for 11,824 ML, while 419 ML was extracted for town supply. The total volume used was approximately 10,750 ML less than that reported for the previous year (2021/22), which was 22,995 ML.

Substantial late spring rainfall followed by good autumn rains shortened the irrigation season and resulted in a considerable reduction in the total volume extracted. In Neuarpur there was 8,000 ML (approx.) less extracted compared to the previous year. A reduced volume was also extracted in other zones including 2,300 ML less than average in the Northern Zone (see Table 4 and Figure 2 for a summary of usage in past years).

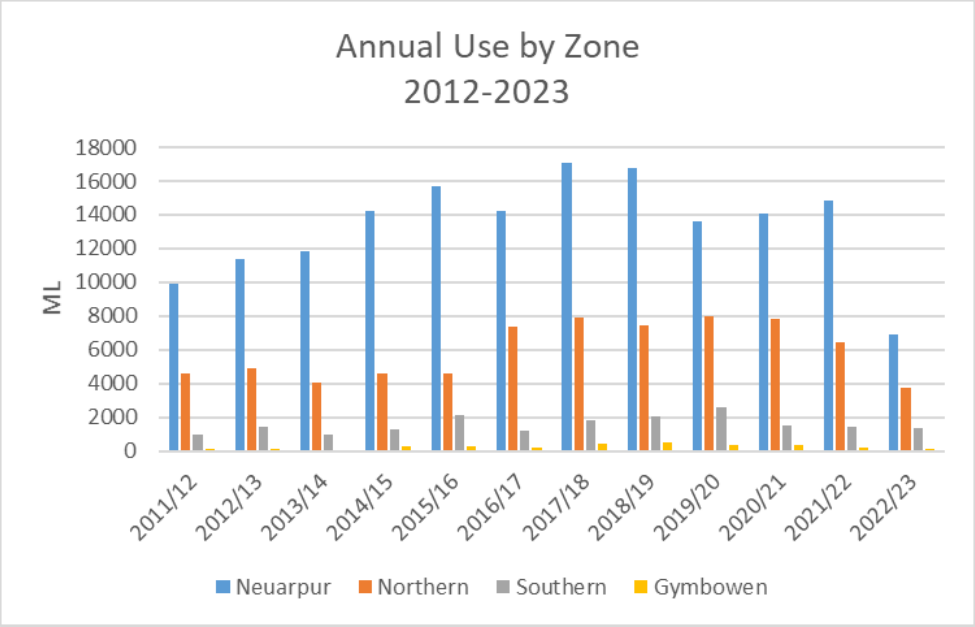
Table 3: Summary of groundwater extractions by management zone 2022/23.

Zone	Number of licences	Permanent Entitlement Volume ML	Extraction (Usage) 2022/23 ML
Neuarpur	45	24,691	6,944
Northern	68	21,957	3,770
Southern	36	5,630	1,377
Gymbowen	11	1,052	152
TOTAL	**160**	**53,330**	**12,244**

Table 4: Summary of groundwater use by management zone since 2011/12

Zone	Licence Volume (30 June 2023) ML	Annual Use (ML)											
		2011/12	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23
Neuarpur	24,691	9,947	11,410	11,868	14,246	15,676	14,223	17,086	16,784	13,590	14,101	14,877	6,944
Northern	21,957	4,040	4,901	4,053	4,589	4,611	7,353	7,920	7,409	7,948	7,855	6,472	3,770
Southern	5,630	831	1,440	975	1,294	2,103	1,212	1,858	2,049	2,605	1,496	1,442	1,377
Gymbowen	1,052	29	164	69	291	268	209	446	497	377	350	204	152
TOTAL	53,330	14,847	17,915	16,965	20,420	22,658	22,998	27,310	26,739	24,520	23,802	22,995	12,244

Figure 2: West Wimmera GMA Annual extraction by management zone.



2.4. Restrictions

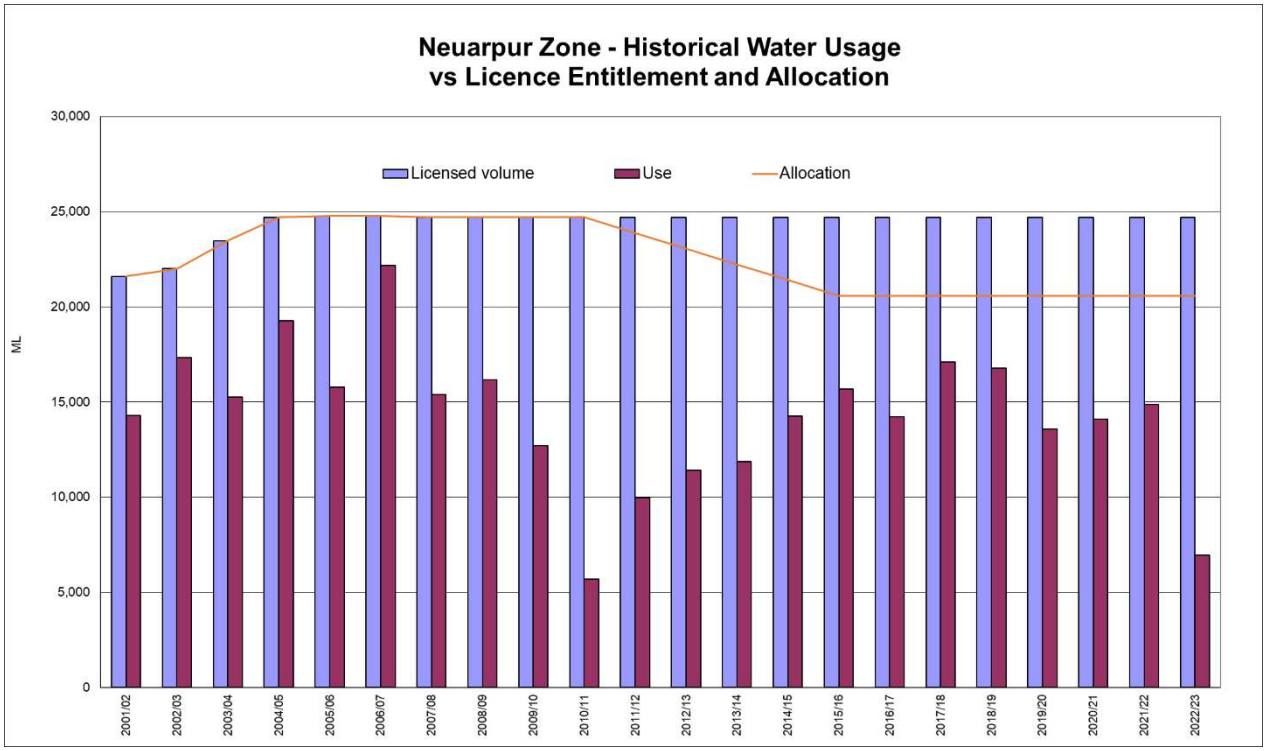
Restrictions have been in place since 2011 to address the declining groundwater levels observed in Neuarpur sub-zone 1. All licences in Neuarpur Sub-zone 1 were restricted to 80% of entitlement in 2022/23, while licences within the remaining zones of the West Wimmera GMA have remained at 100% of licence entitlement.

Figure 3 illustrates observed extraction as compared to the volume available for use over the past 20 years in the Neuarpur Zone. While there is less water technically available due to the 80% restriction to entitlement, the reduced volume being extracted is not solely attributed to the restriction as the total extraction volume has not reached the total available volume since the restrictions were imposed. Although a total of 20,573 ML is available under the restriction, the average use over the 20-year period is 14,300 ML (7,000 ML more than that extracted in 2022/23). While the rate of decline is not as great as

previously observed, groundwater levels continue to be in decline and the restriction to 80% of entitlement will remain for 2023/24.

A method for assessing the need, and process for implementing any new restrictions for the remainder of the GMA, is described within the West Wimmera GMA Local Management Plan (Section 7.2). There are no restrictions foreshadowed in response to the observed change in groundwater level in recent years based on this assessment (see section *3.1.1. Groundwater trend analysis*).

Figure 3: Neuarpur Zone water use, licence entitlement volume and allocation over time.



2.5. Summary of groundwater trading 2022/23

Groundwater trading, either permanent or temporary, provides flexibility for new and existing users to manage production and in some cases establish new developments. Trading rules for the West Wimmera GMA have been established to maximise opportunities for groundwater trading, while preserving the management objective for each zone. The West Wimmera GMA trading rules allow (subject to assessment) groundwater trades within zones. Trades cannot occur into Neuarpur Sub-zone 1, or the Yanipy, Apsley or Langkoop Sub-zones. Any trade or transfer must be approved by GWMWater prior to the taking of the additional water volumes.

During 2022/23 there were two temporary transfers of water entitlement, both in Neuarpur Zone 1, and one permanent trade (5 ML) of water entitlement in the Northern Zone.

There was one new licence issued for a volume of 15ML from the unallocated volume in the Ullswater sub-zone (see Section 2.9).

2.6. Carryover

Carryover provides the ability for a licensee's unused allocation to be used in the following water year. Unused allocation to an upper limit of 30% licence volume may be carried over to the following year. In Neuarpur sub-zone 1, this equates to an upper limit of 30% of the total restricted entitlement volume. The end of season water usage statements issued by GWMWater provide licensees with the volume of carryover available for the following season.

2.7. Compliance and Enforcement

The Victorian Government has a zero tolerance approach for unauthorised water take. GWMWater, as the delegate for the Minister for Water, is responsible for the compliance and enforcement of the rules and legislative requirements surrounding the take and use of unregulated surface water and groundwater.

Meter reading and compliance checks are conducted by GWMWater throughout the year. When a licence holder fails to comply with the licence conditions, GWMWater investigates the matter, taking any necessary action, in line with the GWMWater Compliance and Enforcement Strategy (available at www.gwmwater.org.au/ces). In a groundwater sense, unauthorised take (or 'overuse') typically occurs when groundwater users extract a volume beyond that which is their account (available volume) – even if they have the intention of balancing it up later.

There were a small number of potential non-compliances matters detected in the West Wimmera GMA during 2022/23. These matters have since been resolved.

2.8. Domestic and stock bores

Landholders can apply for a licence to construct a domestic and stock bore via the Victorian Water Register (http://waterregister.vic.gov.au/). There were 10 bore construction licence issued for the construction or alteration of domestic and stock bores in the West Wimmera GMA in 2022/23. This is 20 fewer bore construction licences issued than in the previous year.

2.9. New Entitlement Volume

In 2022/23 GWMWater finalised the framework and pricing for unallocated groundwater. The capital charge will be applied to water available for licencing within the PCV in the Northern, Gymbowen and Southern Zones of the West Wimmera GMA (given all other zones are fully allocated). Further information regarding available groundwater can be obtained from GWMWater.

3. Groundwater Monitoring

3.1. Groundwater Levels

Groundwater levels are measured at regular intervals in dedicated observation bores located throughout the West Wimmera GMA. The bores are monitored by Ventia under the State Observation Bore Network monitoring contract, of which GWMWater is a partner.

While there is an extensive observation bore network across the GMA, there is a greater number of observation bores located in the vicinity of concentrated groundwater extraction. Figure 4 illustrates the location of observation bores monitored during the 2022/23 period. There are 15 observation bores that are telemetered and water level data is recorded and transmitted hourly via the mobile phone network. Quarterly observations of groundwater levels are measured in those bores which are not telemetered.

Groundwater monitoring information is publicly available via DECCA Water Measurement Information System at http://data.water.vic.gov.au/

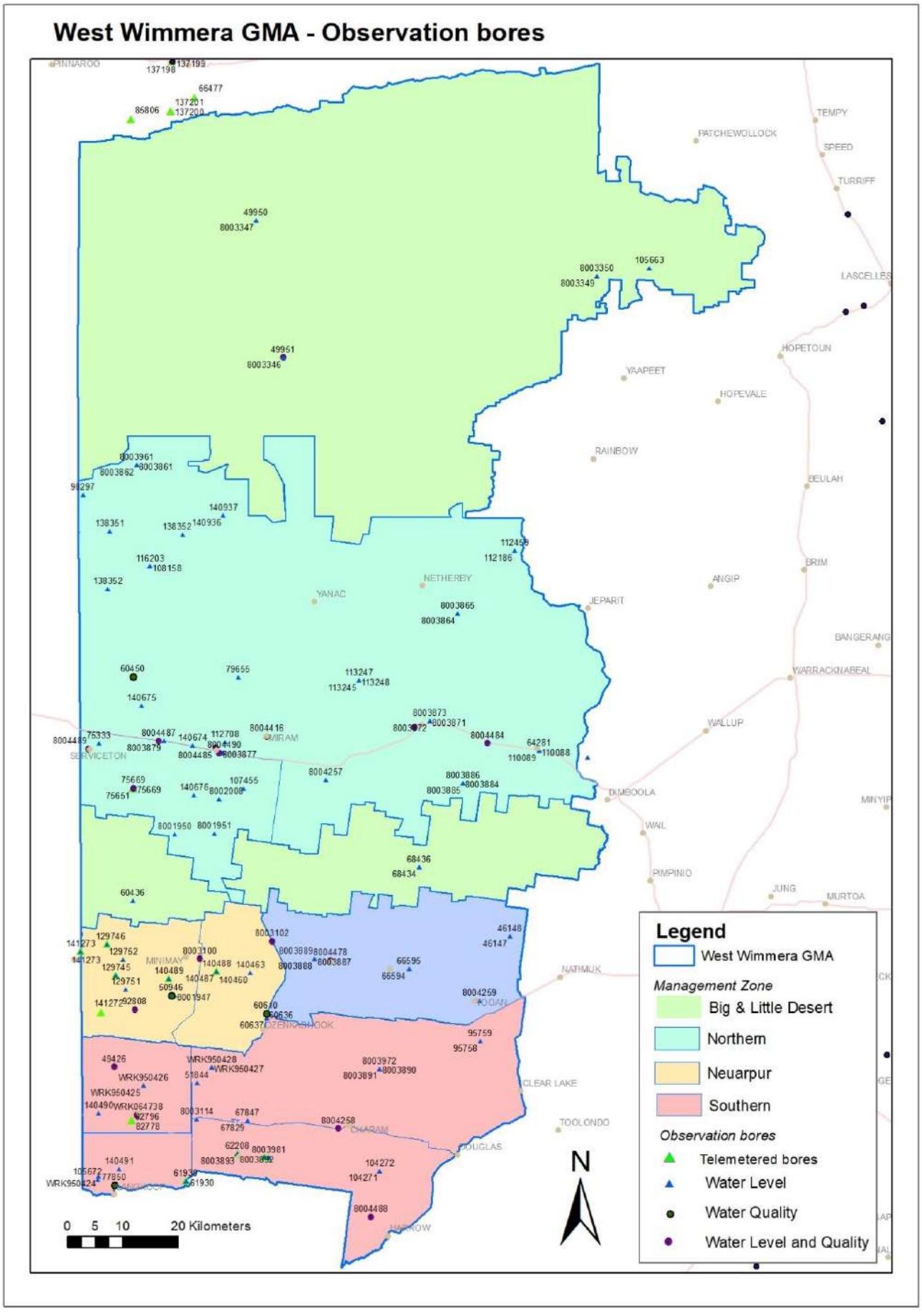
Graphs illustrating groundwater levels over time in a number of selected observation bores are illustrated in Appendix 1. Table 5 provides a status summary by zone (or sub-zone).

While there was a considerable reduction in the total volume of groundwater extracted due to the shortened irrigation season, there was no obvious response in groundwater level other than where irrigation is more concentrated in Neuarpur and Yanipy.

Table 5: Observed groundwater status over the 2022/23 period.

Zone/sub-zone	Groundwater Status 2023	Comment
Big Desert	Stable	
Northern	Generally stable	Yanipy sub-zone: seasonal trends of drawdown and recovery are evident in monitoring bores located close to where there is a higher volume of extraction for irrigation. Groundwater levels are influenced by a combination of climate and irrigation. They have recovered to levels previously observed indicating the resource is at or close to equilibrium. Overall a stable trend exists for the Northern zone.
Little Desert	Stable	
Neuarpur sub-zone 1	Declining	Declining, however, the rate of decline has reduced compared to that observed prior to 2010.
Neuarpur sub-zone 2	Generally stable	Generally stable, however closer to sub-zone 1 ongoing declining trends are observed.
Gymbowen	Stable	
Southern – Apsley and Langkoop,	Generally stable	Groundwater level in this zone are influenced by climatic conditions and use within the Victoria and South Australia border zone.
Southern - Edenhope	Stable	
Southern - Ullswater	Stable	

Figure 4: Observation bores monitored during 2022/23



3.1.1. Groundwater trend analysis

Appendix 1 includes the yearly trend analysis undertaken for the zones identified as being at moderate-high risk of not achieving the management objective of stable groundwater levels (GHD, 2018). These graphs allow changes in groundwater level trends to be assessed on an annual, 5 yearly, and longer-term basis. The methodology averages the annual change in groundwater level data (averaged across a number of bores) and minimises potential bias by not being dependent on any one particular observation bore.

The cumulative graphs represent change in water level over time. They illustrate a steadying in the downward trend in Neuarpur Sub-zone 1 and a slight annual decline in Neuarpur Sub-zone 2, groundwater level recovery in the Yanipy sub-zone.

With the exception of Neuarpur Sub-zone 1, the only sub-zones where an annual drawdown in excess of the trigger level of 0.1m has been recorded at least once in the last five years are Yanipy, Northern (west) and Apsley. These instances have not necessitated a management response because the breaches of the trigger level have not been recorded in consecutive years (stable or water level increase have occurred in the intervening years) as illustrated by the three year rolling average trend line.

While the annual change in groundwater level (rolling average) in Neuarpur Sub-zone 1 has been close to the 0.1m threshold for the past three years there has been a continued decline of groundwater levels in Sub-zone 1 and as such the restriction to 80% of licence volume is to remain for 2023/24 season. The rate of decline will be assessed further as part of the five year technical review to determine the implications for the 2024/25 irrigation season as per the prescriptions of the Local Management Plan.

Groundwater levels in the Apsley and Langkoop sub-zones are influenced both by climatic conditions and use within Victoria and South Australia. The aquifer is relatively quick to respond to rainfall and pumping as indicated by the groundwater level tends. In recent years, groundwater trends had shown signs of stabilisation within the Apsley and Langkoop sub-zones, however a marginal decline in groundwater levels was noted in 2021/22, which coincided with above average groundwater extraction. In 2022/23 there was a recovery in groundwater levels, with average use observed in these sub-zones.

The limestone aquifer is confined in the Yanipy Sub-zone by an overlying clay layer. It therefore displays cyclic fluctuations in groundwater levels as a result of the change in pressure from seasonal groundwater pumping in the sub-zone. This sub-zone requires assessment over an extended period due to the large variation in groundwater level being observed due to the nature of the aquifer. The yearly trend analysis for the Yanipy sub-zone was reviewed to include an additional representative bore (107455). This bore was added to provide a more spatial representation of the overall groundwater trend for the sub-zone being more distant from the pumping influences while still exhibiting some seasonal variation.

The "*on watch*" status placed on Yanipy Sub-zone last year due to the consecutive years of declining levels has been re-assessed given the more positive change in the rolling average

to indicate a short-term recovery in groundwater level. The Cumulative Annual Change graph illustrates the overall result of the annual change in groundwater level over the years. The remainder of the Northern Zone exhibits relatively stable groundwater levels.

Stable groundwater levels continue to be observed in the Ullswater and Edenhope sub-zones, and the Gymbowen zone, where the volumes of groundwater extraction are currently relatively low and there is little to no impact evident to groundwater levels.

3.2. Water Quality

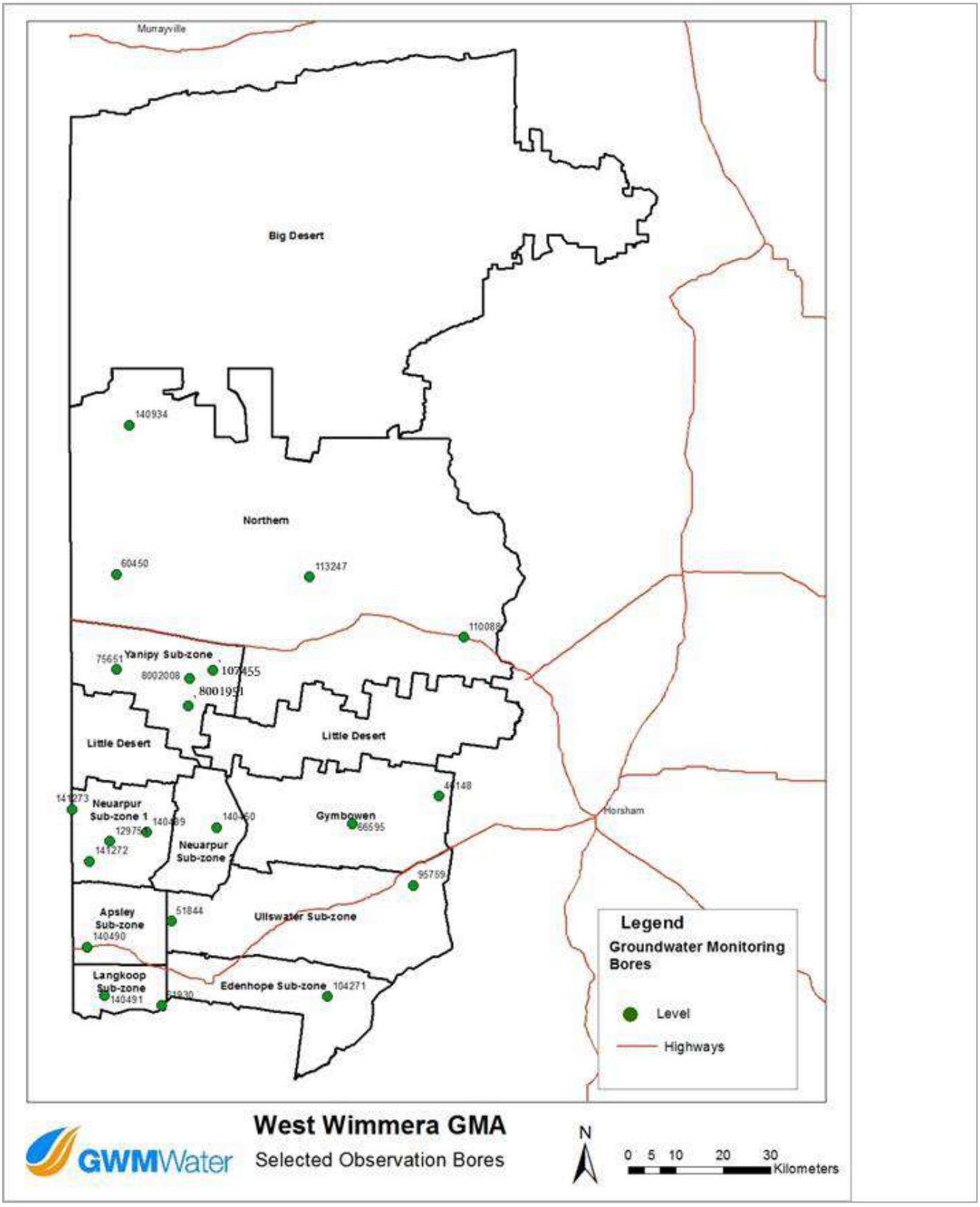
The location of bores screened in the Tertiary Limestone Aquifer (TLA) which are monitored regularly for salinity as part of the SOBN program are illustrated in Appendix 2. There were a small number of bores that missed being sampled in the 2021/22 period, this was rectified and annual samples were taken where accessible in early in 2022/23.

In general, the salinity of the TLA is low and less than 1,500 EC units (uS/cm) or 1,000 mg/L of Total Dissolved Solids (TDS) through the middle section of the GMA, and less than 2,500 EC (1,500 mg/L TDS) across most of the remaining area. Towards the southern and northern boundaries, salinity typically ranges from 2,500 to 5,400 EC (1,500 to 3,500 mg/L TDS). There are small, isolated areas of higher salinity groundwater toward the south-west corner of the GMA and north of Kaniva.

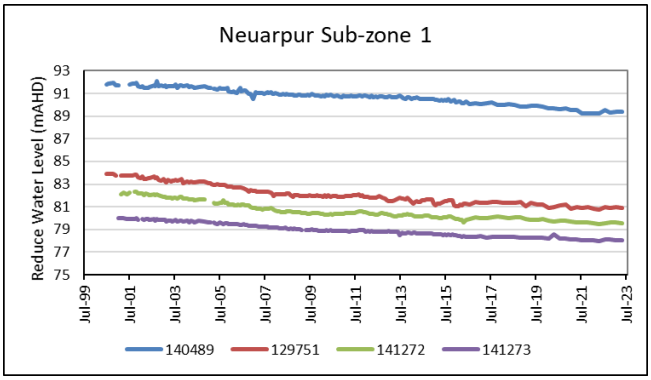
The salinity of groundwater appears to be relatively stable in most of the bores sampled, and has not been identified as a resource management issue.

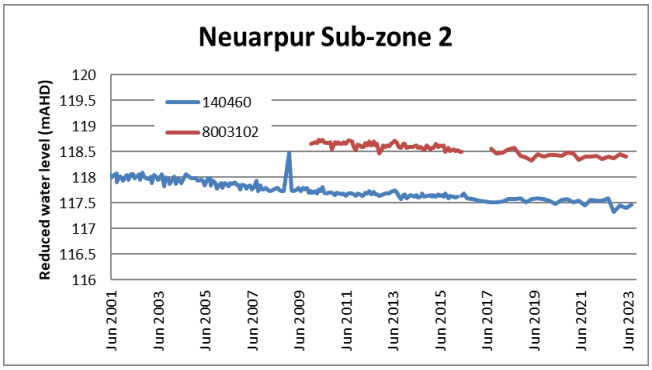
Appendix 1

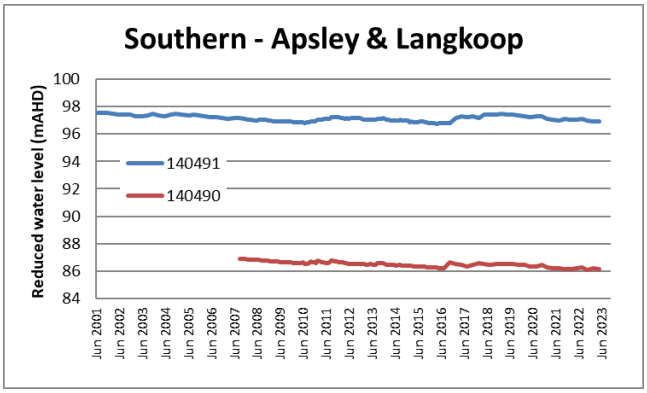
A1.1: Locations of selected observation bores

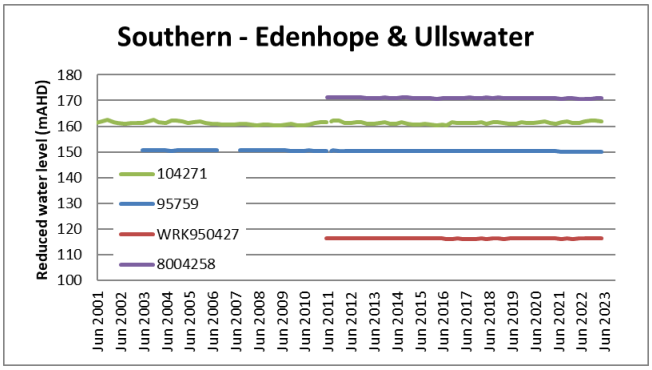


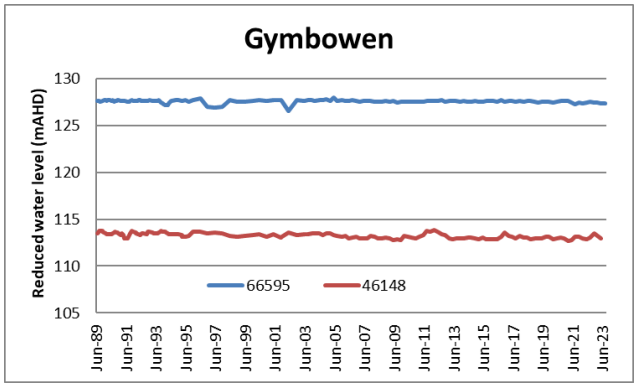
A1.2: Observed Groundwater Levels (selected bores)

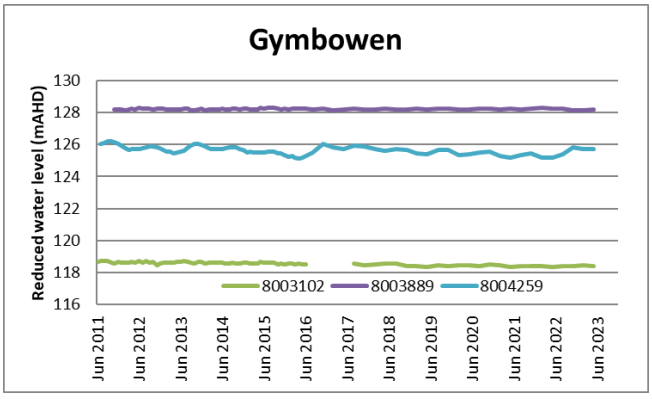


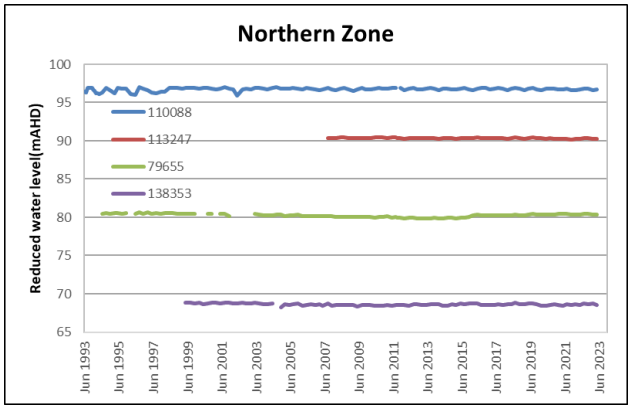


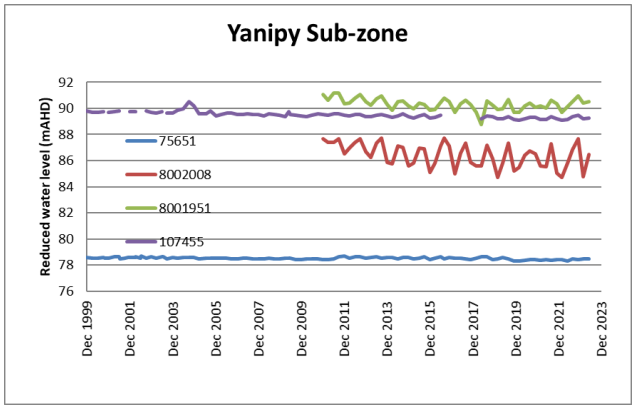




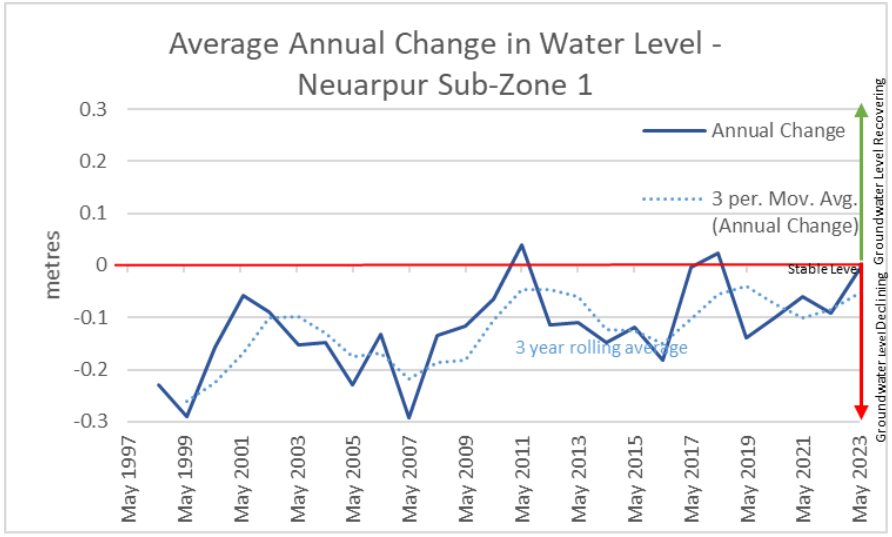


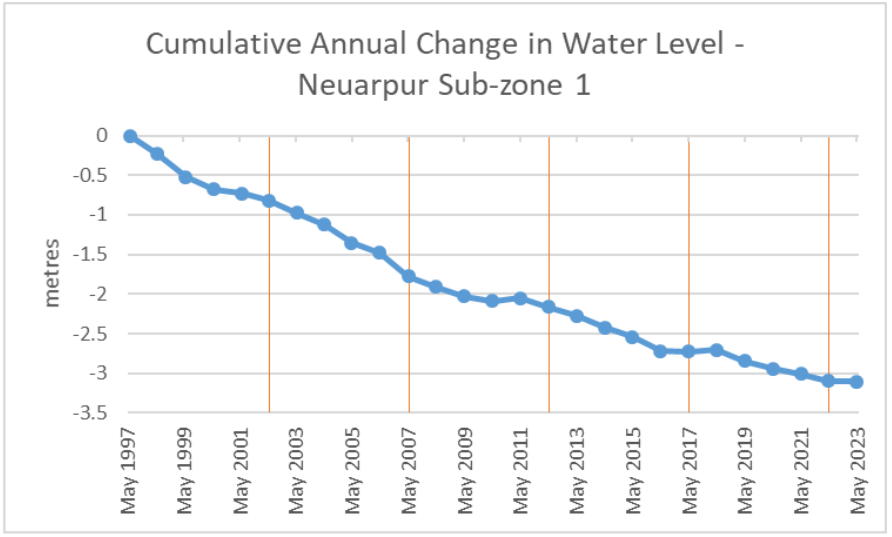


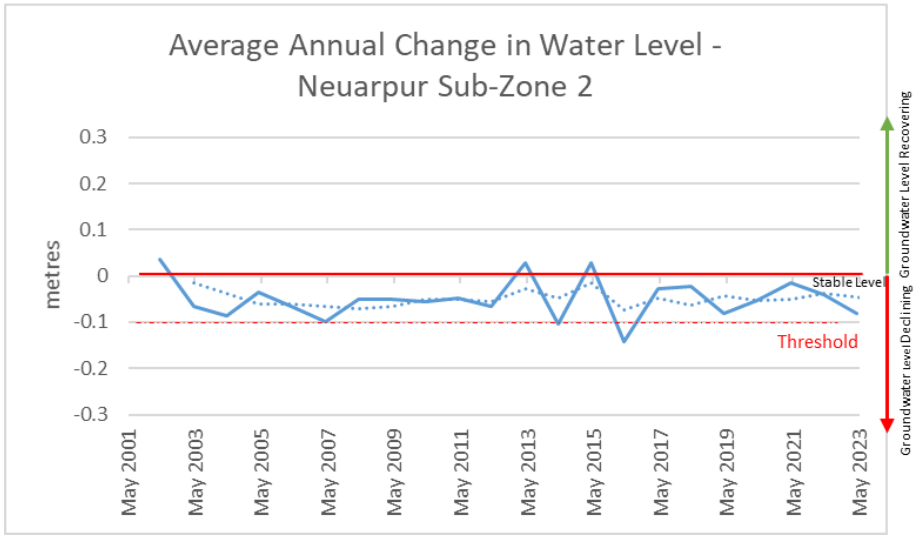


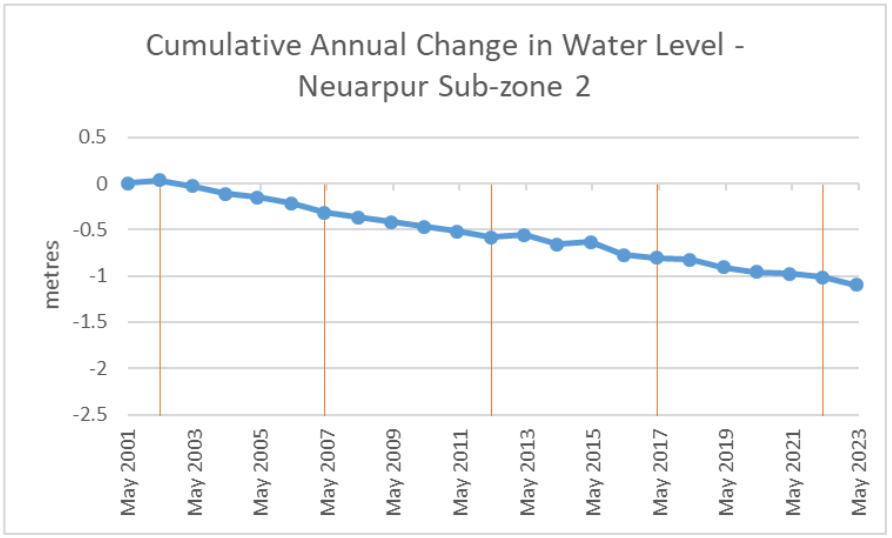


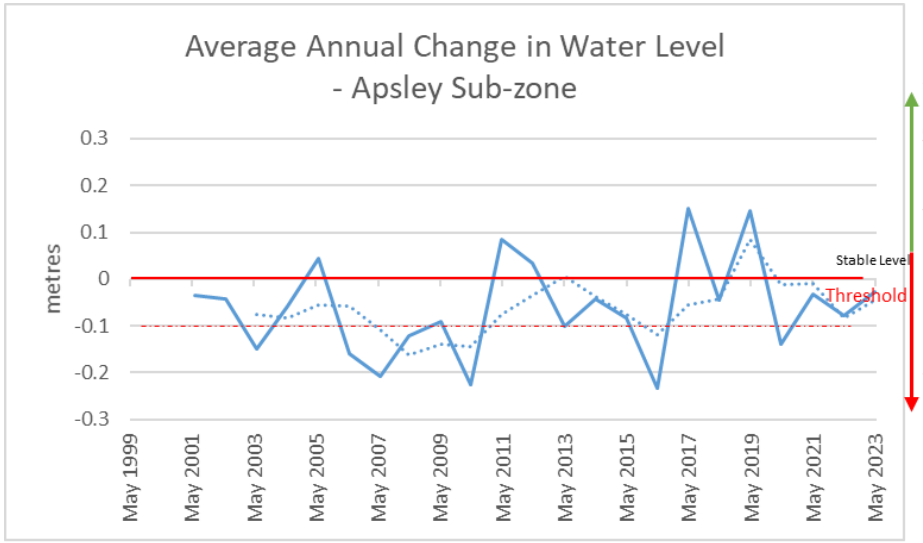
A1.3: Yearly groundwater level trend analysis – representative hydrographs for West Wimmera GMA zones and sub-zones

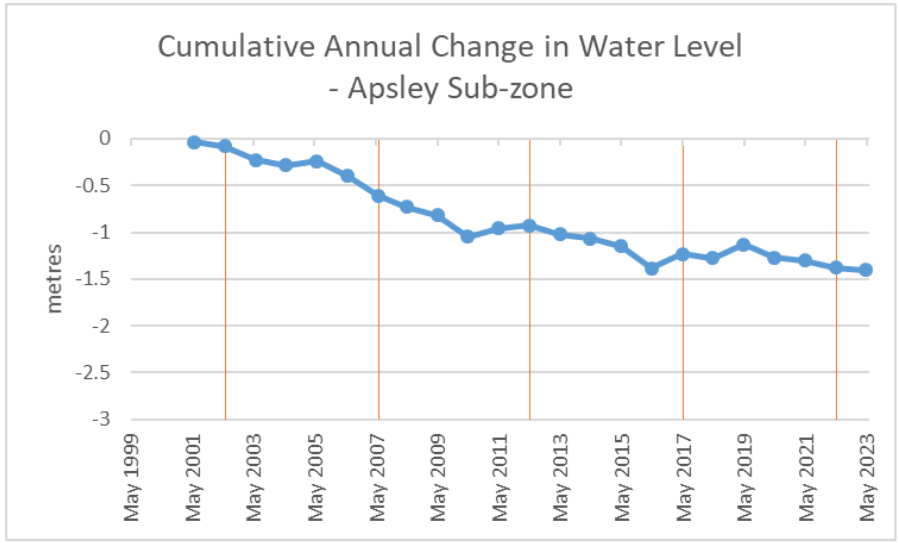


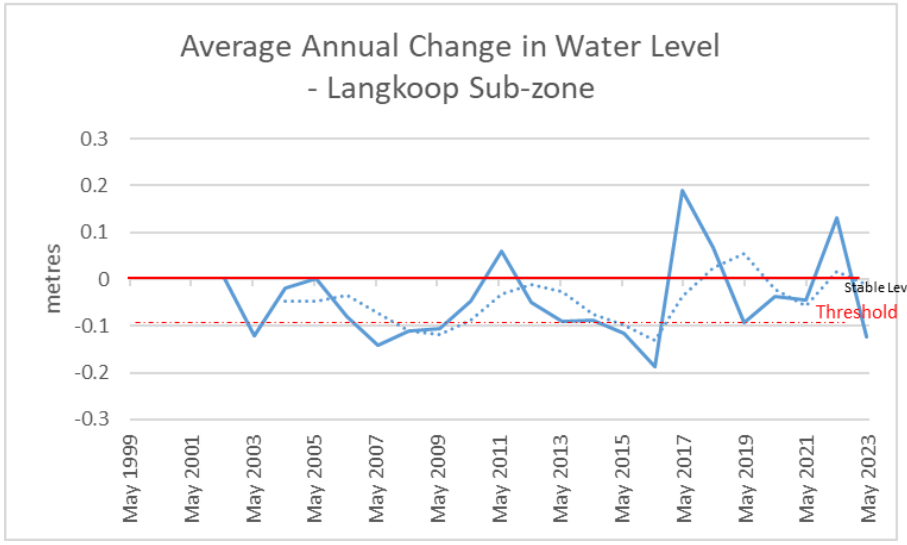


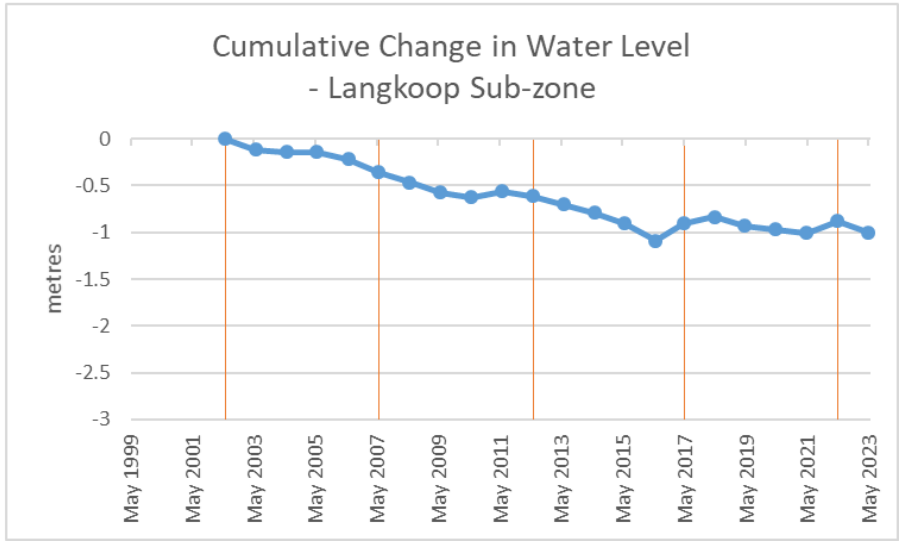


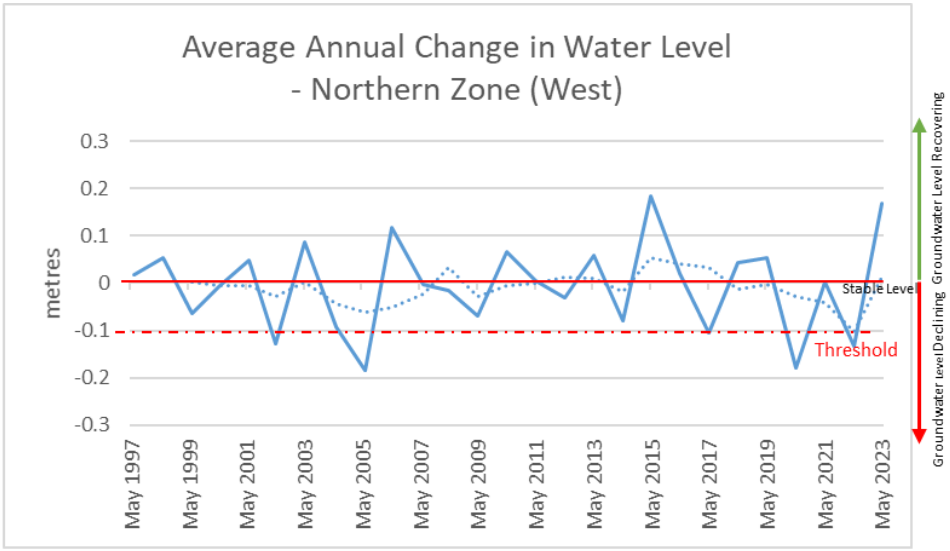


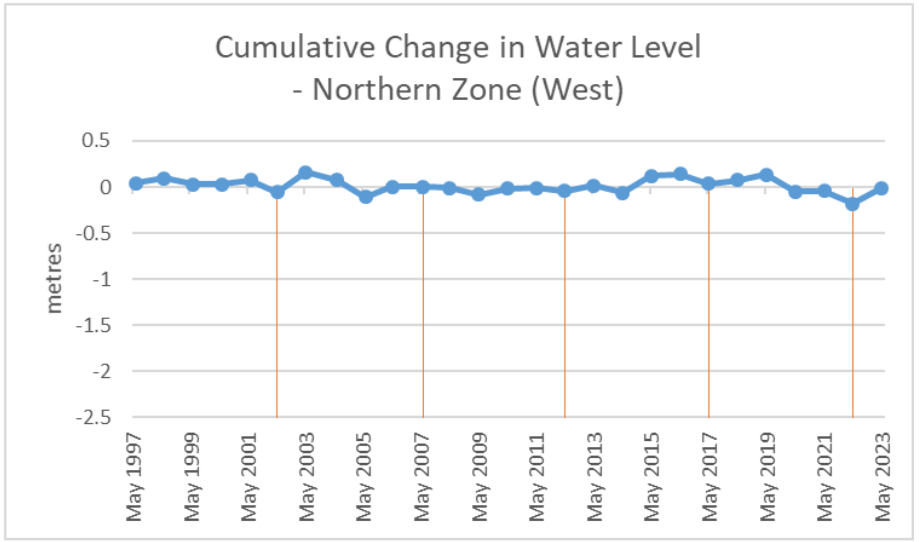

Average Annual Change in Water Level
- Apsley Sub-zone
metres
0.3
0.2
0.1
0
-0.1
-0.2
-0.3
Stable Level
Threshold
Groundwater level Declining
Groundwater Level Recovering
May 1999
May 2001
May 2003
May 2005
May 2007
May 2009
May 2011
May 2013
May 2015
May 2017
May 2019
May 2021
May 2023

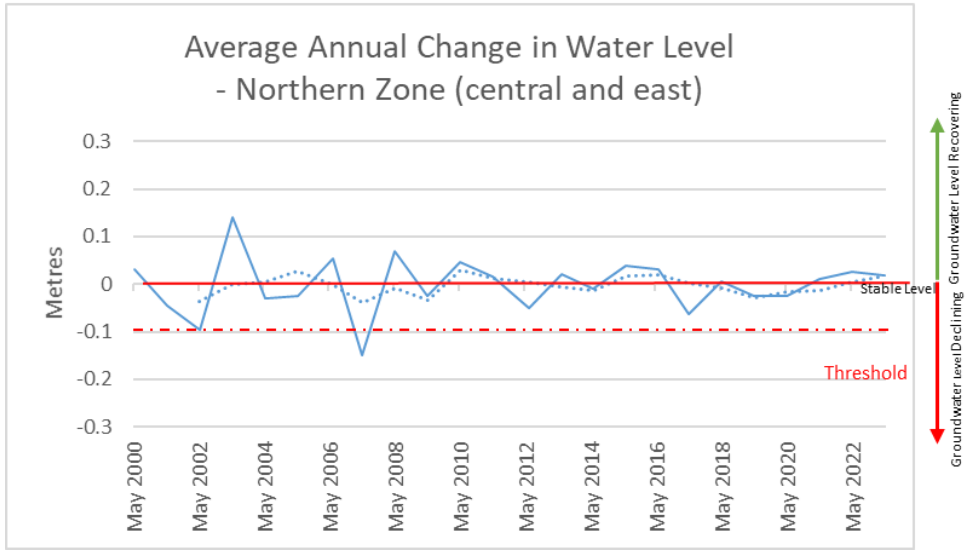

Cumulative Annual Change in Water Level
- Apsley Sub-zone
metres
0
-0.5
-1
-1.5
-2
-2.5
-3
May 1999
May 2001
May 2003
May 2005
May 2007
May 2009
May 2011
May 2013
May 2015
May 2017
May 2019
May 2021
May 2023

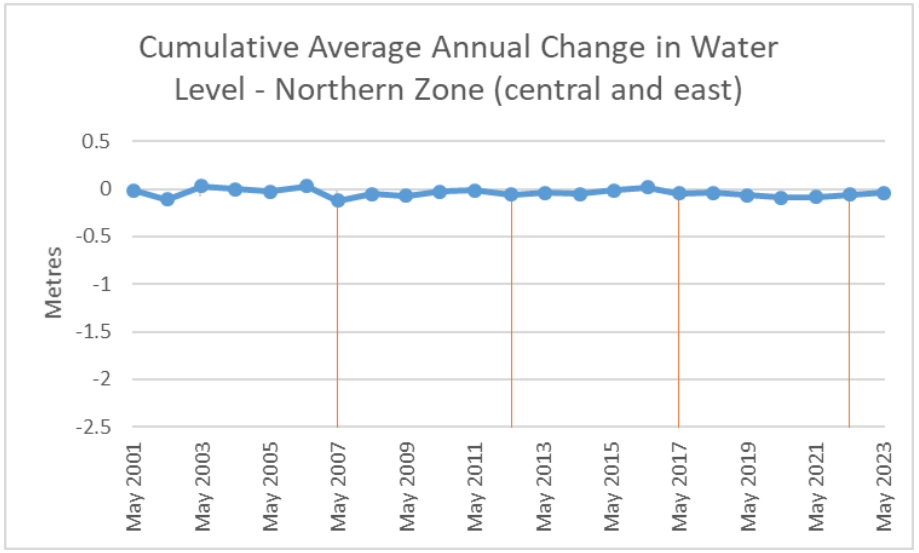

Average Annual Change in Water Level
- Langkoop Sub-zone
metres
0.3
0.2
0.1
0
-0.1
-0.2
-0.3
Stable Level
Threshold
Groundwater level Declining
Groundwater Level Recovering
May 1999
May 2001
May 2003
May 2005
May 2007
May 2009
May 2011
May 2013
May 2015
May 2017
May 2019
May 2021
May 2023

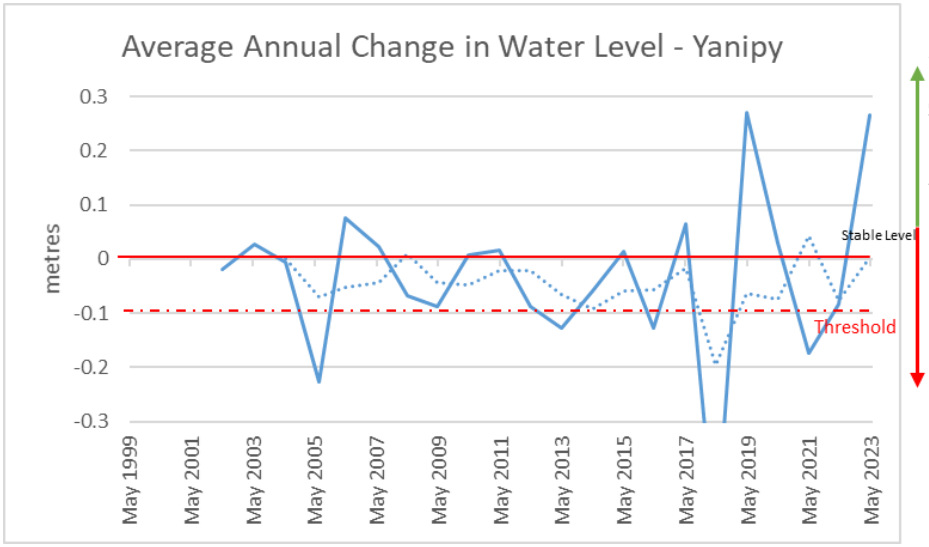

Cumulative Change in Water Level
- Langkoop Sub-zone
metres
0
-0.5
-1
-1.5
-2
-2.5
-3
May 1999
May 2001
May 2003
May 2005
May 2007
May 2009
May 2011
May 2013
May 2015
May 2017
May 2019
May 2021
May 2023

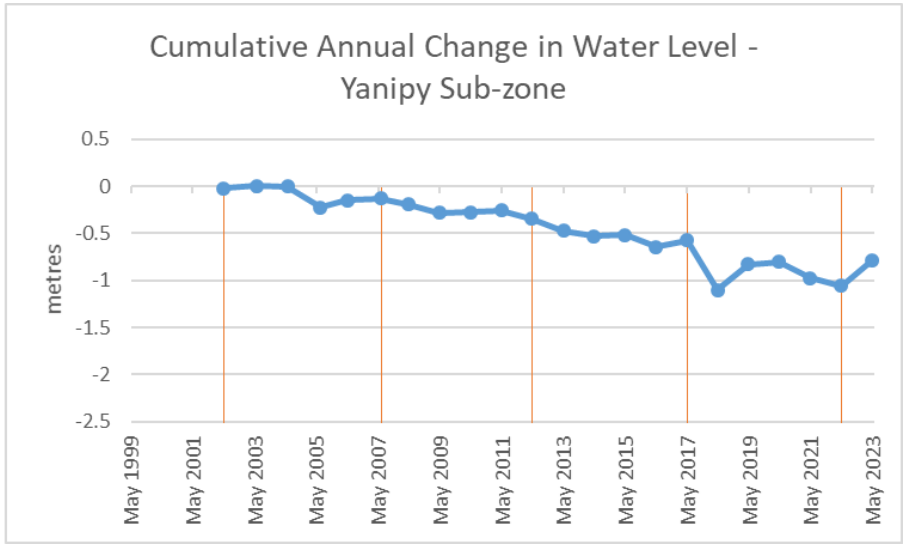

Average Annual Change in Water Level
- Northern Zone (West)
metres
0.3
0.2
0.1
0
-0.1
-0.2
-0.3
Stable Level
Threshold
Groundwater level Declining
Groundwater Level Recovering
May 1997
May 1999
May 2001
May 2003
May 2005
May 2007
May 2009
May 2011
May 2013
May 2015
May 2017
May 2019
May 2021
May 2023

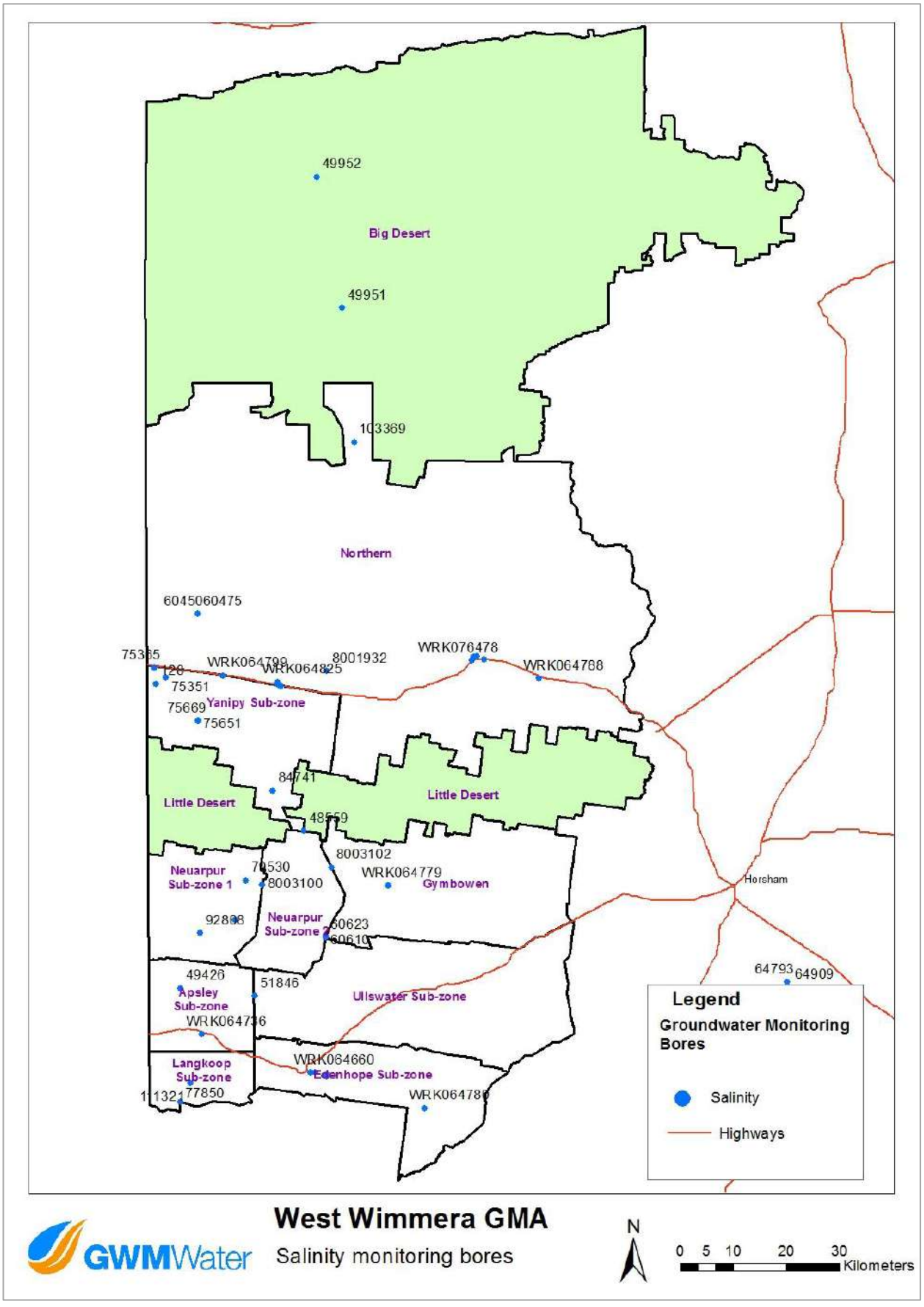

Cumulative Change in Water Level
- Northern Zone (West)
metres
0.5
0
-0.5
-1
-1.5
-2
-2.5
May 1997
May 1999
May 2001
May 2003
May 2005
May 2007
May 2009
May 2011
May 2013
May 2015
May 2017
May 2019
May 2021
May 2023


Average Annual Change in Water Level
- Northern Zone (central and east)
Metres
0.3
0.2
0.1
0
-0.1
-0.2
-0.3
Stable Level
Threshold
Groundwater level Declining
Groundwater Level Recovering
May 2000
May 2002
May 2004
May 2006
May 2008
May 2010
May 2012
May 2014
May 2016
May 2018
May 2020
May 2022


Cumulative Average Annual Change in Water
Level - Northern Zone (central and east)
Metres
0.5
0
-0.5
-1
-1.5
-2
-2.5
May 2001
May 2003
May 2005
May 2007
May 2009
May 2011
May 2013
May 2015
May 2017
May 2019
May 2021
May 2023


Average Annual Change in Water Level - Yanipy
metres
0.3
0.2
0.1
0
-0.1
-0.2
-0.3
Stable Level
Threshold
Groundwater level Declining
Groundwater Level Recovering
May 1999
May 2001
May 2003
May 2005
May 2007
May 2009
May 2011
May 2013
May 2015
May 2017
May 2019
May 2021
May 2023


Cumulative Annual Change in Water Level - Yanipy Sub-zone
metres
0.5
0
-0.5
-1
-1.5
-2
-2.5
May 1999
May 2001
May 2003
May 2005
May 2007
May 2009
May 2011
May 2013
May 2015
May 2017
May 2019
May 2021
May 2023

Appendix 2

A2.1: Salinity monitoring locations