Annual Report 2018/19

West Wimmera Groundwater Management Area

July 2018 to June 2019

EXECUTIVE SUMMARY

The West Wimmera Groundwater Management Strategy, 2011, is a long-term management framework for groundwater resources in the West Wimmera Groundwater Management Area (GMA). It was developed as an adaptive management approach whereby management regimes can be refined based on social, economic and environmental considerations, and monitoring information such as groundwater levels.

This report details GWMWater's activities in administering the West Wimmera Groundwater Management Strategy 2011 (The Strategy) during the period 1 July 2018 to 30 June 2019.

This report is available on the GWMWater website: www.gwmwater.org.au.

Status of the Groundwater Resource

Groundwater levels and metered extraction have continued to be monitored in the West Wimmera Groundwater Management Area (GMA). The data indicates that groundwater levels are responding to the level of extraction as expected. Where there is intensive extraction and use, there is a decline in groundwater level (such as Neuarpur), and where extraction is more disperse, groundwater levels are generally stable. Salinity remains relatively stable based on samples analysed.

Groundwater use

A total volume of 26,739 megalitres was extracted from the Tertiary Limestone Aquifer in 2018/19, which is less than half of the total licensed volume in the GMA. Overall extraction was 571 ML less than the previous year. Two licensees used more than their available volume and were issued with a Notice of Contravention.

Restrictions

All licences in Neuarpur Sub-zone 1 remained restricted to 80% of entitlement in 2018/19. This restriction level will also continue for season 2019/20.

Groundwater management framework

To ensure that groundwater is managed consistently within the groundwater management policy framework and incorporates improvements in our understanding of the groundwater resource, the future groundwater management in the West Wimmera GMA beyond 2018/19 will be guided by the West Wimmera GMA Local Management Plan (LMP).

The LMP contains concise summary of the West Wimmera Groundwater Management Strategy (therefore a supporting document to the Strategy), including updated management rules based on a 5-year technical review undertaken in 2018.

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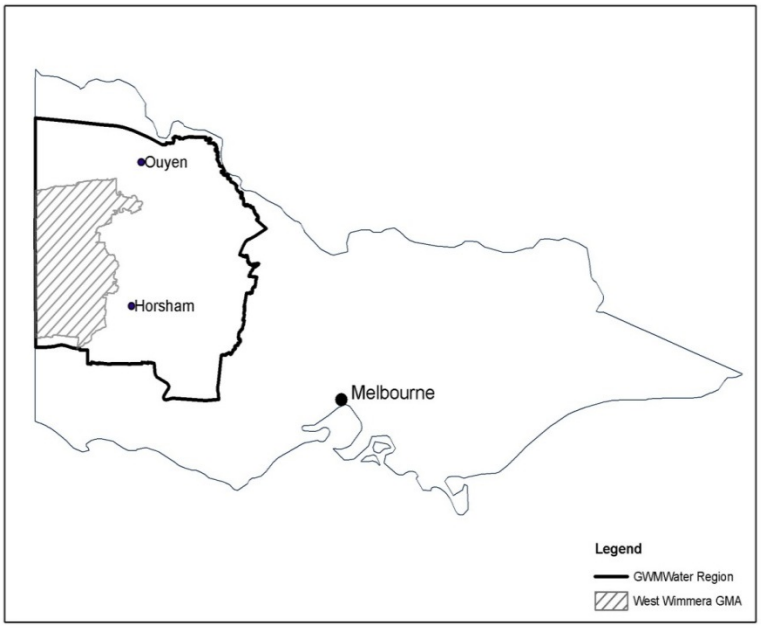
1. Introduction

This report provides an overview of groundwater management activities undertaken in the West Wimmera Groundwater Management Area (GMA) during the period 1 July 2018 to 30 June 2019.

The West Wimmera GMA is located in the far west of Victoria (as indicated in Figure 1), extending from north of the Glenelg River to the Big Desert, and east from the South Australian border to the Wimmera River. Groundwater is the primary source of water for irrigation, urban, stock and domestic supply in the GMA.

Figure 1: Location of West Wimmera GMA



The West Wimmera GMA is generally underlain by three main aquifers which vary in thickness, yield and water quality. The aquifers are the shallow Pliocene (Parilla) Sands Aquifer (PSA), Tertiary Limestone Aquifer (TLA) and the deeper Tertiary Confined Sands Aquifer (TCSA). For much of the area there are layers of clay between the aquifers.

The Tertiary Limestone Aquifer (TLA) is the focus for groundwater management in the West Wimmera GMA. The TLA is the resource that is primarily used for stock and domestic, irrigation and town supplies across the area, due to its water quality and yield.

The status of the groundwater resource varies within the West Wimmera GMA. Most of the GMA shows stable groundwater trends, however, some parts have been exhibiting declining groundwater levels. Management zones have been established within the GMA to represent areas that have common management requirements. These are based on hydrogeology, the management objective (stable groundwater trends) or other distinguishing characteristic such as intensity of licences and use.

The objective of groundwater management in the GMA is to ensure the groundwater resource of the area is managed in an equitable manner, and to achieve the long-term sustainability of the resource; in turn, maintaining the social, environmental and economic benefits that groundwater provides to the region.

As represented in Figure 2, the zones for the West Wimmera GMA are:

- Big Desert
- Northern (including Yanipy sub-zone)
- Little Desert
- Neuarpur Zone (sub-zones 1 and 2)
- Gymbowen
- Southern, with sub-zones Apsley, Langkoop, Edenhope and Ullswater

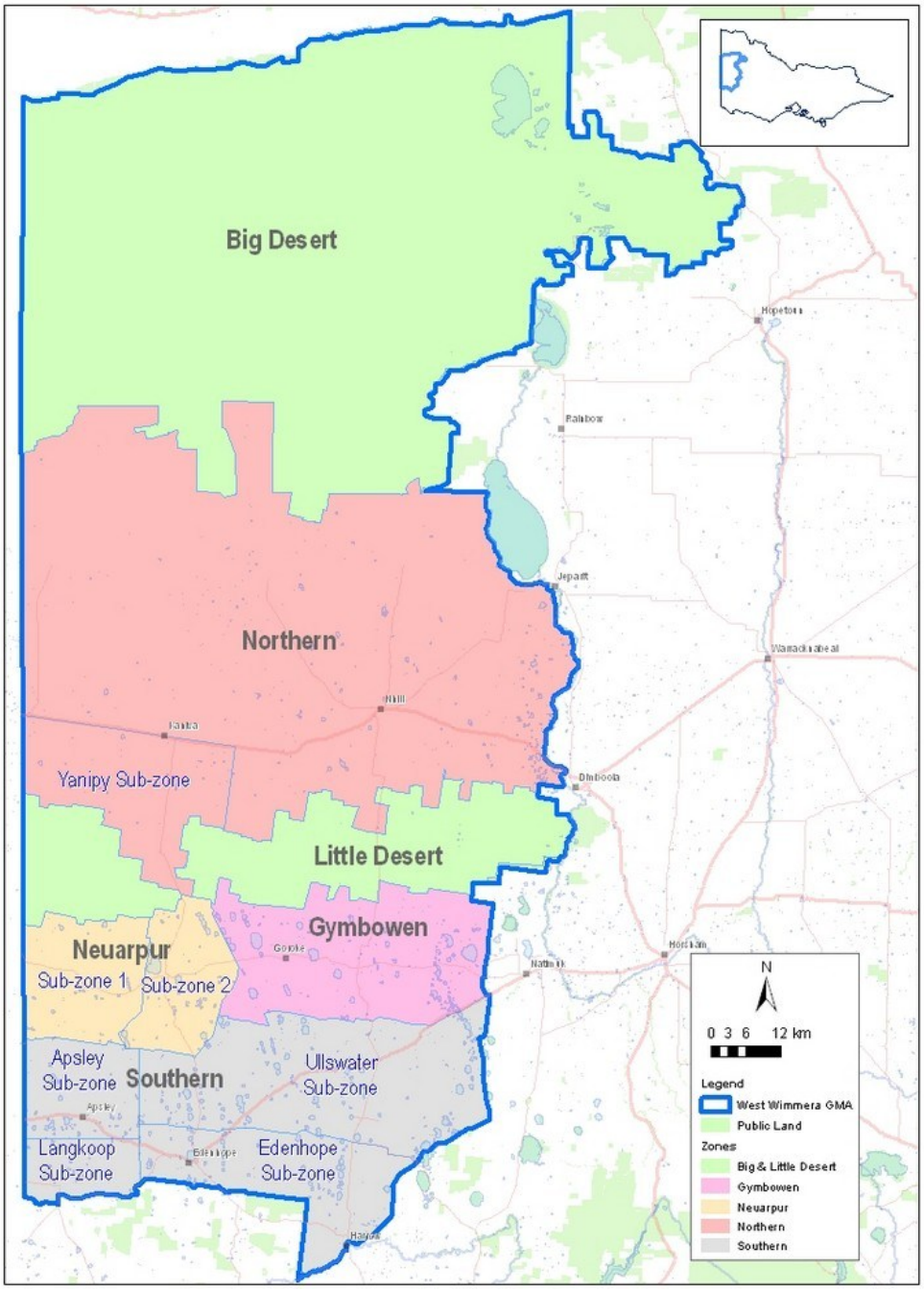


Figure 2: Zones of the West Wimmera GMA

2. Groundwater Management

2.1. Licence entitlement

The Permissible Consumptive Volume (PCV) for the West Wimmera GMA is outlined in Table 1. In Victoria, the volume of licensed entitlement in a given zone or sub-zone must not exceed the applicable PCV.

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 2019

Management Zone	Number of Licences	Licensed volume (ML)
Neuarpur	*48*	*24,691*
Northern	*75*	*22,340*
Southern	*35*	*5,615*
Gymbowen	*10*	*952*
Total	***168***	***53,598***

2.3. Groundwater use

There are currently 168 groundwater licences in the West Wimmera GMA, with a total entitlement volume of 53,598 ML. The number of licences is three fewer than 2017/18 due to licence aggregation following permanent trade of entitlement volume, and one licensee in the Northern Zone surrendering a licence for a volume of 5ML.

During 2018/19, 102 licences were active and extracted a total volume of 26,739 ML (see Table 3 for use by zone). Extraction for irrigation and commercial purposes accounted for 26,174 ML, while 565 ML was used for urban town supply. Total extraction in the previous year (2017/18) was 27,310 ML (see Table 4 and Figure 3 for a summary of usage in past years).

Within the GMA, in the order of 200 meters are used to measure the volume of groundwater being extracted from licenced bores. Meters in Neuarpur and Apsley can be read remotely as required, while manual readings are taken for the remaining meters twice yearly; once in January/February (mid-irrigation season) and end of season readings in June. Domestic and stock use is not metered.

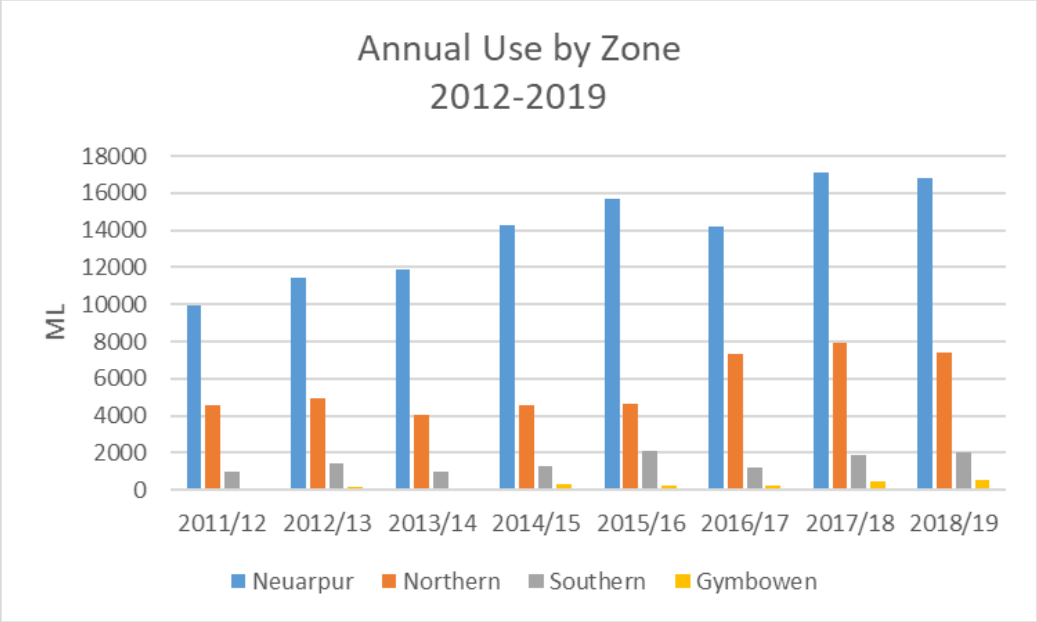
***Table 3**: Summary of metered groundwater extraction by management zone 2018/19.*

Zone	No of licences	Permanent Entitlement Volume ML	Extraction Volume 2018/19 ML
Neuarpur	48	24,691	16,784
Northern	75	22,340	7,409
Southern	35	5,615	2,049
Gymbowen	10	952	497
TOTAL	**168**	**53,598**	**26,739**

***Table 4**: Summary of metered groundwater extraction by management zone since 2011/12*

Zone	Permanent Entitlement Volume ML	Use (ML)							
		2011/12	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19
Neuarpur	24,691	9,947	11,410	11,868	14,246	15,676	14,223	17,086	16,784
Northern	22,345	4,040	4,901	4,053	4,589	4,611	7,353	7,920	7,409
Southern	5,615	831	1,440	975	1,294	2,102.5	1,212	1,858	2,049
Gymbowen	952	29	164	69	291	268.5	209	446	497
TOTAL	**53,603**	**14,847**	**17,915**	**16,965**	**20,420**	**22,658**	**22,998**	**27,310**	**26,739**

Figure 3: *West Wimmera GMA: annual metered extraction by zone.*



2.4. Restrictions

Restrictions are being used to manage groundwater use in Neuarpur sub-zone 1 to address the declining groundwater levels observed in that area.

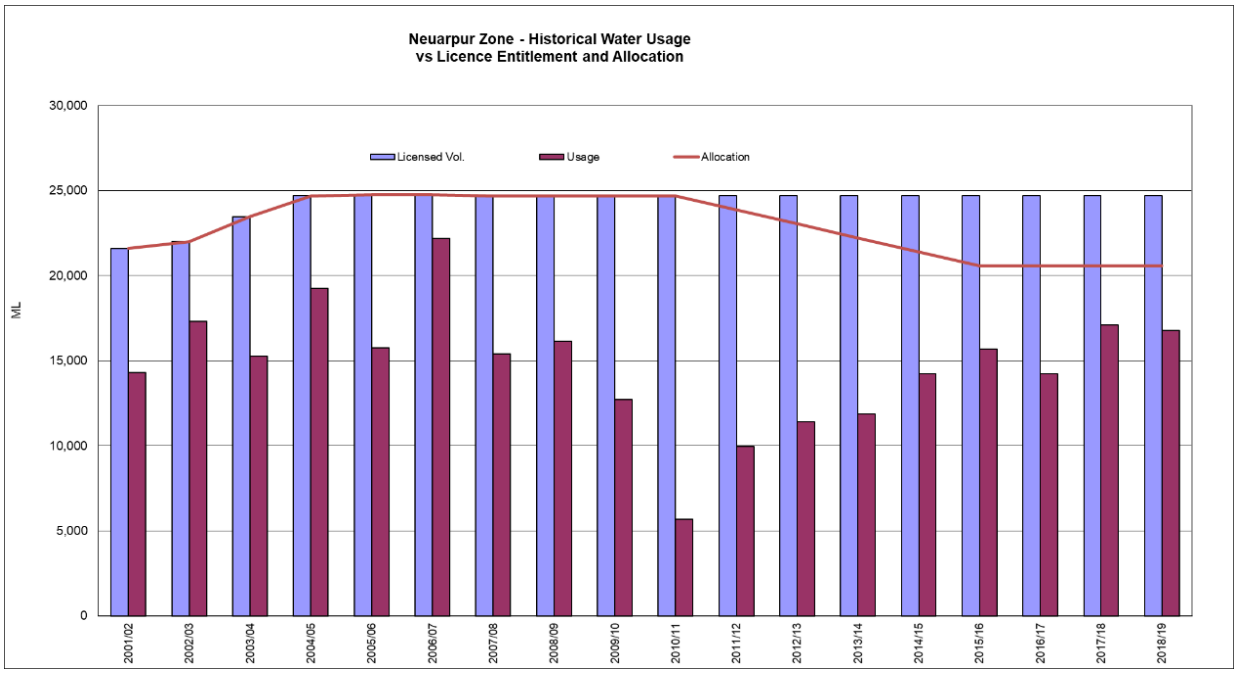
All licences in Neuarpur Sub-zone 1 were restricted to 80% of entitlement in 2018/19, while licences within the remaining zones of the West Wimmera GMA have remained at 100% of licence entitlement.

As can be seen in Table 3, most water used in the West Wimmera GMA was extracted in the Neuarpur Zone. Figure 4 illustrates extraction volume as compared to the volume available for use over the past 17 years in the Neuarpur Zone.

While there is less water technically available due to the 80% of entitlement restriction, there not been an obvious corresponding reduction in the volume being extracted in Neuarpur sub-zone 1. This is because total annual extraction has not yet reached the volume available under the 80% of entitlement restriction.

A method for assessing the need for, and process for implementing any new restrictions within the zones of the GMA has been developed. This method is documented in the West Wimmera Groundwater Management Area Local Management Plan. The most recent assessment undertaken has suggested no new restrictions are anticipated.

Figure 4: *Neuarpur Zone extraction volume (usage), licence entitlement volume and allocation over time.*



2.5. Summary of groundwater trading 2018/19

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 in the West Wimmera have been established to maximise opportunities for groundwater trading while preserving the management objective for each zone, protecting the integrity of the aquifer, and minimising the potential for unacceptable impacts on existing groundwater users and the environment.

There were 18 temporary transfers of water entitlement processed, mostly within the Neuarpur Zone.

Five permanent transfers of water entitlement for a total volume of 688 ML were processed during 2018/19.

2.6. Carryover

Approximately 11,400 ML was carried over into 2018/19. Carryover provides licence holders with the ability to access unused volumes in the following water year. Unused water allocation, to an upper limit of 30% licence volume, is automatically carried over to the following year. In Neuarpur sub-zone 1, this equates to an upper limit of 30% of the total restricted volume available. For the remainder of the GMA, licensees may carry over up to 30% of their full (un-restricted) licence entitlement, should it remain unused.

2.7. Licence compliance

Meter reading and compliance checks conducted by GWMWater identified a number of potential instances of failure to comply with licence conditions. The majority of these matters were resolved to the satisfaction of GWMWater prior to the end of the 2018/19 season.

Two instances of failure to comply with licence conditions resulted in the issue of a Notice of Contravention under Section 151 of the *Water Act* by GWMWater. A Notice of Contravention specifies corrective action a licence holder must take, and any applicable timeframes for that action. Both of these instances related to the unauthorised take of groundwater.

2.8. Domestic and stock bores

Landholders can apply for licenses to construct domestic and stock bores via the Victorian Water Register. There were 59 bore construction licence issued for the construction of new bores in the West Wimmera GMA in 2018/19, the majority being for domestic and stock purposes.

2.9. Sale of unallocated groundwater

The 2015 Sale of Unallocated Water process has come to an end. Successful applicants have had over three years in which to complete the necessary investigations, planning requirements and drilling of extraction bore(s) prior to finalising their purchase. While a number of purchases have been finalised, there is one applicant currently progressing through the final stages of the licence process.

Some successful applicants elected to withdraw from the process, meaning that unallocated volumes remain in some zones. GWMWater will determine the ongoing process for the sale of the remaining unallocated volume available in the Gymbowen Zone, and Ullswater and Edenhope Sub-zones of the Southern Zone.

3. Groundwater Monitoring

3.1. Groundwater levels

Groundwater levels are measured quarterly in dedicated observation bores located throughout the West Wimmera GMA. There are a greater number of observation bores located in the vicinity of concentrated groundwater extraction areas. There is generally an observation bore within five kilometres of an active licence of greater than 200 ML. Figure 5 illustrates the location of observation bores monitored during the 2018/19 period in the GMA. There are 15 observation bores that are telemetered with water level data being recorded and transmitted hourly.

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

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

Figure 5: Observation bores monitored during 2018/19

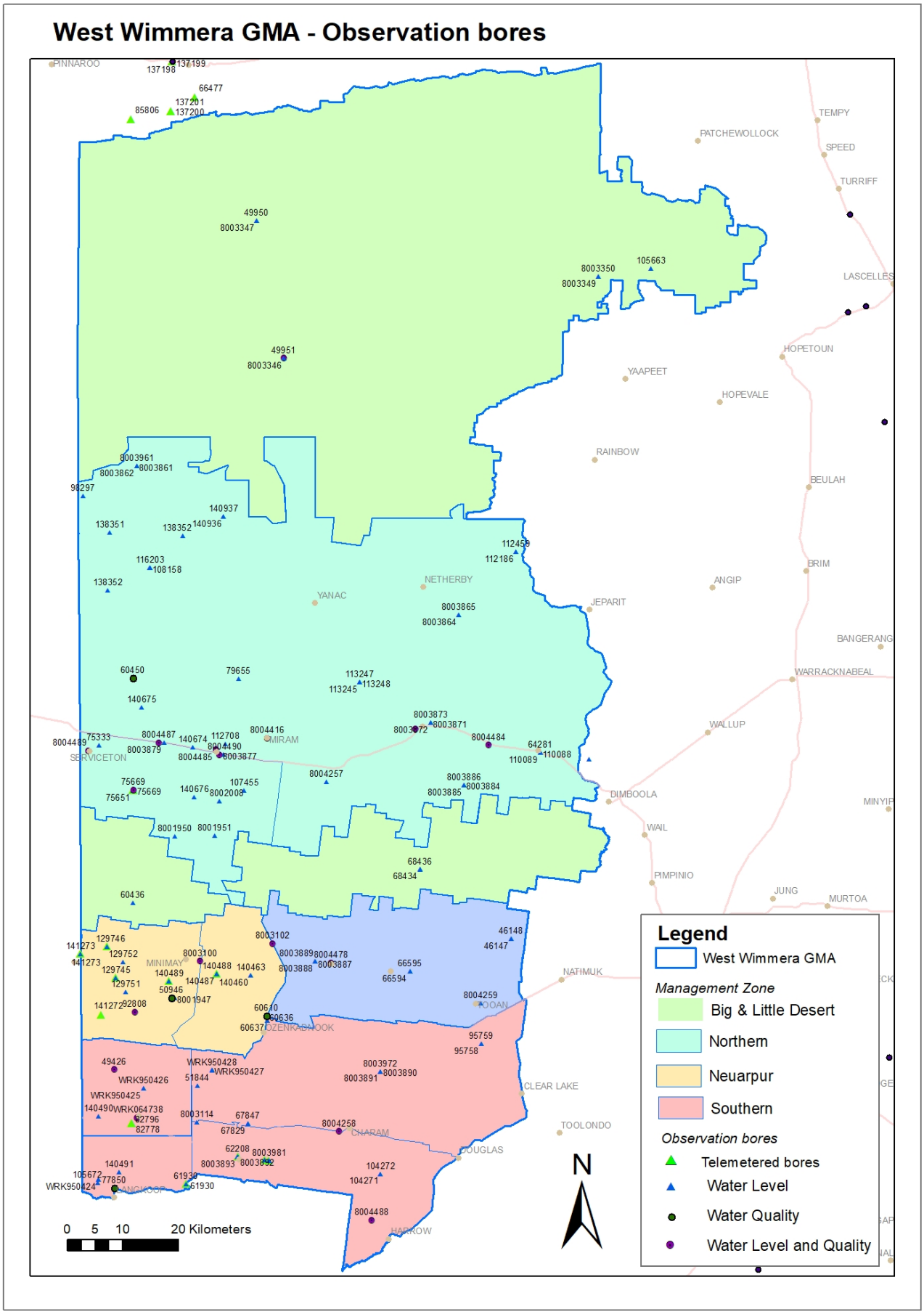


Table 5: Groundwater status & observed trends during 2018/19 period

Zone/sub-zone	Groundwater Status 2019	Comment
Big Desert	Stable	Little to no groundwater extraction.
Northern	Generally stable, localised drawdown noted	Yanipy sub-zone - seasonal trend of drawdown and recovery is evident in bores located close to where there is a higher volume extraction for irrigation. There is some localised residual drawdown. Overall stable trend for the Northern zone.
Little Desert	Stable	Little to no groundwater extraction.
Neuarpur sub-zone 1	Declining	Declining, however, the rate of decline has reduced since 2010.
Neuarpur sub-zone 2	Generally stable	Generally stable, however closer to the western boundary ongoing minor decline has been identified.
Gymbowen	Stable	
Southern – Apsley and Langkoop,	Generally stable	Groundwater levels in this zone are influenced both by climatic conditions and use in South Australia. Some bores, particularly in the Langkoop sub-zone, are indicate a response to rainfall.
Southern - Edenhope	Stable	Stable trend.
Southern - Ullswater	Stable	Stable trend.

3.1.1. Groundwater trend analysis

Appendix 1 presents hydrographs of the yearly trend analysis for zones identified as being at moderately-high risk of not achieving the zone management objective of stable groundwater levels. The graphs illustrate the average annual change in groundwater level for each zone (or sub-zone). The methodology averages groundwater level data and minimises potential bias by not being dependent on any one observation bore.

The graphs illustrating cumulative change in water level over time show a steadying in the downward trend for Neuarpur, some recovery in levels in Yanipy, Apsley, Langkoop and Northern zones. With the exception of Neuarpur Sub-zone 1, Yanipy, Apsley and Langkoop are the only other zones where a single year annual drawdown in excess of the trigger level of 0.1m has been recorded within the last five years. However, such levels have not been recorded in consecutive years, which otherwise may trigger consideration of a management response.

3.2. Water Quality

The location of bores screened in the Tertiary Limestone Aquifer (TLA) which had been monitored regularly for salinity (up until June 2016) as part of the State Observation Bore Monitoring Network are illustrated in Appendix 2. Annual salinity sampling of these bores (where possible) resumed in 2018/19. Graphs illustrating groundwater salinity results for a selection of these bores are also illustrated in Appendix 2.

In general, the salinity of the TLA is low and less than 1,500 EC units (µS/cm) or approximately 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 and has not been identified as a resource management issue at this time.

4. Future Groundwater Management – Local Management Plan

The West Wimmera Groundwater Management Strategy, 2011, is a long-term management framework for groundwater resources in the West Wimmera Groundwater Management Area (GMA). It was developed as an adaptive management approach whereby management regimes can be refined based on social, economic and environmental considerations, and monitoring information such as groundwater levels. The West Wimmera Groundwater Management Strategy was developed prior to the release of Local Management Plan (LMP) guidelines by the Victorian Department of Environment, Land, Water and Planning (DELWP) in 2014. These guidelines have since been used in the development of Local Management Plans for groundwater and unregulated surface water across the GWMWater region.

In 2018, GWMWater commissioned consultants GHD to complete a five year technical review of the West Wimmera Groundwater Management Strategy, using available groundwater level, quality and extraction data. The outcomes and recommendations of the GHD technical review were sufficient to warrant the preparation of a Local Management Plan for the West Wimmera area. The Local Management Plan intends to compliment and adapt aspects of the West Wimmera Groundwater Management Strategy, based on the outcomes and recommendations of the technical review. The development of the Local Management Plan brings the documentation of groundwater management for the West Wimmera GMA into alignment with GWMWater's other surface and groundwater management areas.

The management rules for the West Wimmera GMA are documented within the West Wimmera Groundwater Management Strategy (2011) section titled *Management Arrangements*. The management rules from the Strategy have been consolidated within the West Wimmera GMA Local Management Plan. Some of these management rules have been adapted in response to recommendations from the technical review of the Strategy by GHD, and in consultation with the West Wimmera GMA Implementation Committee.

In assessing the effectiveness of the existing management tools, GHD recognised the current Management Zones, Permissible Consumptive Volumes (limit on extraction in a zone), carryover provisions, and localised bore interference management and monitoring, are sound and did not require alteration. Modifications to some of the existing management rules have been made to improve their effectiveness in either protecting the groundwater resource, or removing unnecessary trading restrictions.

While there has been some refinement and adaptation to management rules for the Local Management Plan, the intent of the rules and the underlying management objectives have not changed. The modifications to management rules include:

- Entitlement Intensity rule –simplifying the assessment method.
- Trading rules – allowing trade between Ullswater and Edenhope sub-zones.
- Annual reporting – include more detailed analysis to identify any ongoing decline on a yearly basis for each zone.

- Monitoring – the addition of selected existing monitoring bores to the groundwater monitoring network to improve the spatial and aquifer system coverage, and better inform the adaptive management approach.

The Local Management Plan also incorporates additional detail regarding:

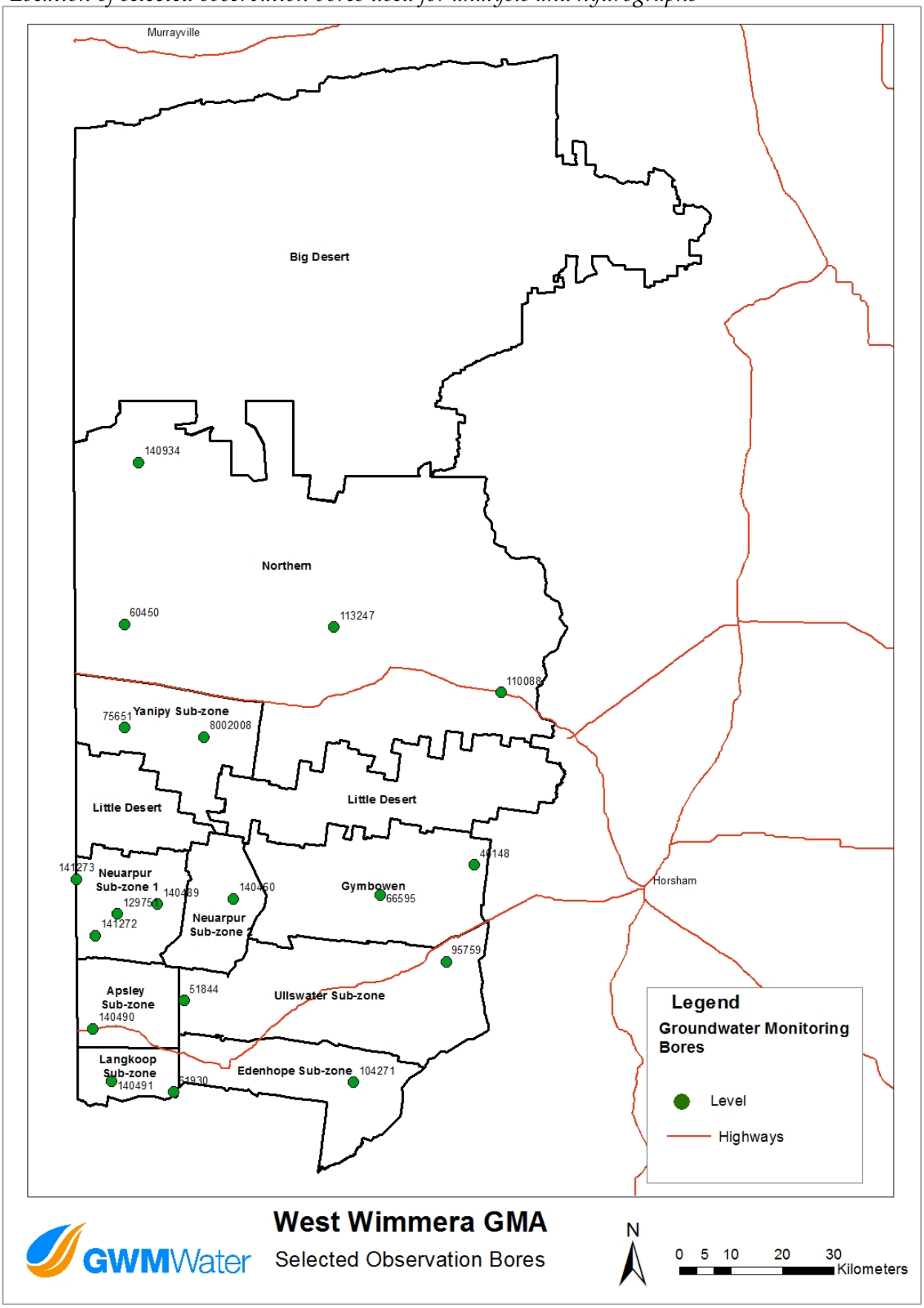
- The most recent information on the groundwater resource conceptualisation:
  - The groundwater resource in the area north of the Apsley zone (Neuarpur and northward) is likely to be 'non-renewable' for management purposes. With extraction in the area exceeding natural recharge, there will likely be an ongoing groundwater level decline. The estimated time for stabilisation of groundwater levels at the current rates of extraction across South Australia and Victoria is between 40 and 150 years.
  - The declining groundwater levels in Neuarpur Sub-zone 1 is driven by extraction within the zone, and is also influenced by some degree by extraction in the adjacent zones, including South Australia.
- A method for assessing the need for and process for implementing any new restrictions. The method takes into consideration a range of drivers that influence observed changes in groundwater levels. The method also considers the nature of groundwater systems, being that they respond gradually over long time periods, even though there may be short-term responses observed. The method provides a means of assessing groundwater level trends annually against a 3 year rolling average and 3 year cumulative change in groundwater level.

The West Wimmera GMA Local Management Plan was presented to the GWMWater Board in July 2019, and was subsequently approved by the Board.

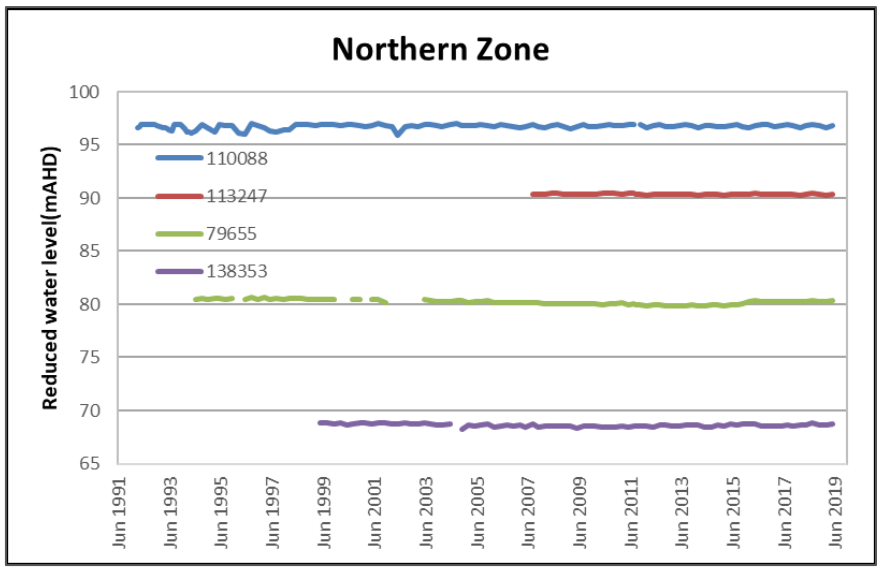
The Local Management Plan will become the primary reference document for groundwater management in the West Wimmera area as of the 2019/20 year. GWMWater will continue to work with its customers, local communities and other stakeholders to ensure that the Local Management Plan is reviewed and updated when necessary to ensure it remains consistent with the groundwater management policy framework, and as our understanding of the groundwater resources of the West Wimmera GMA continues to improve.

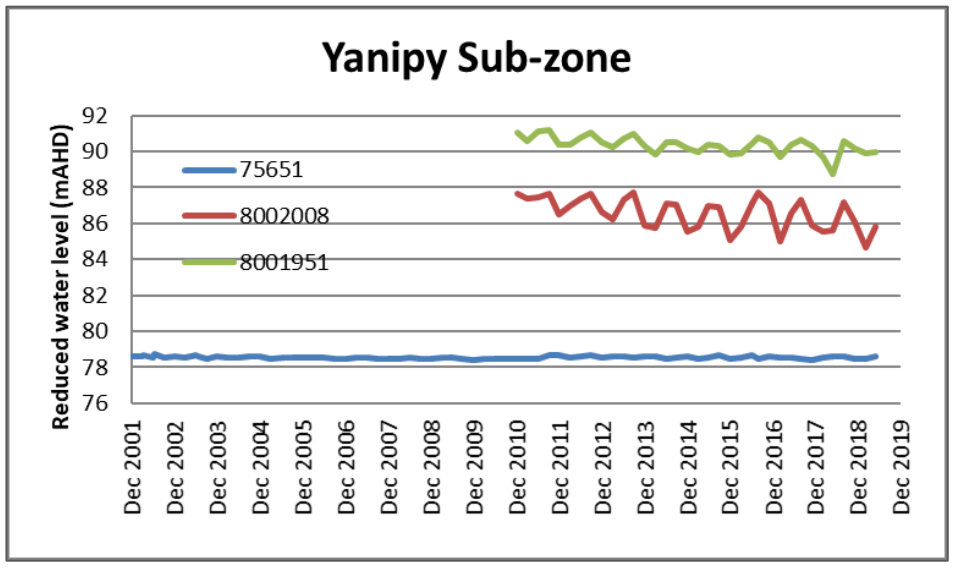
Appendix 1 - Groundwater Level Trends

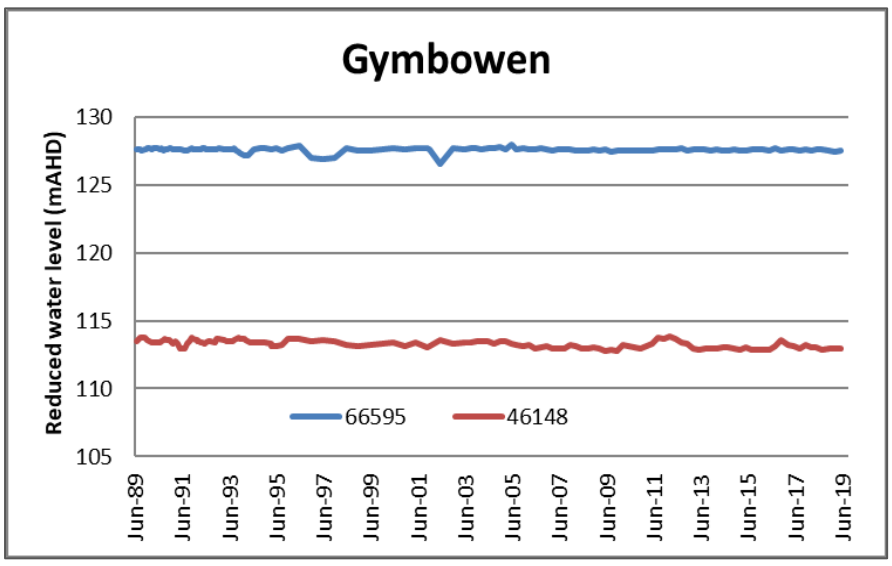
Location of selected observation bores used for analysis and hydrographs

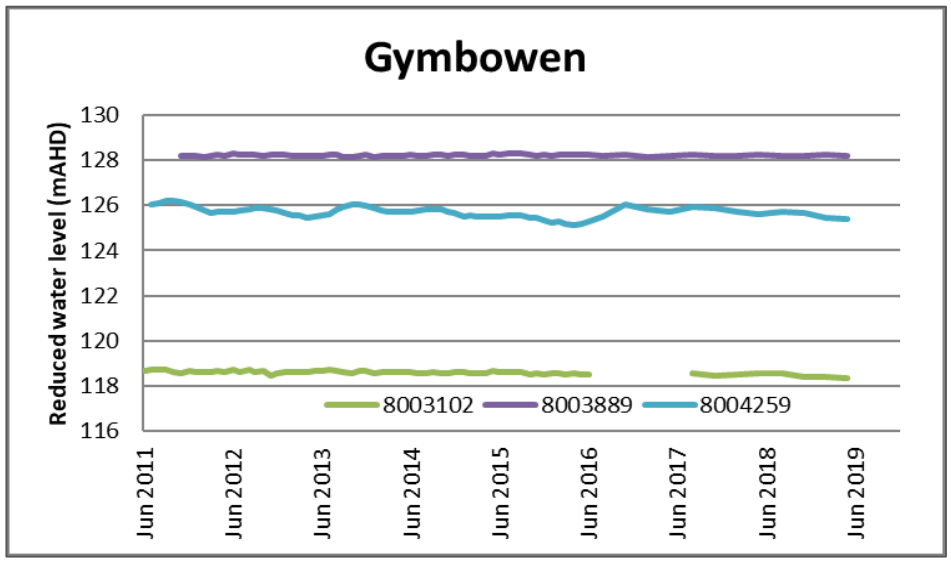


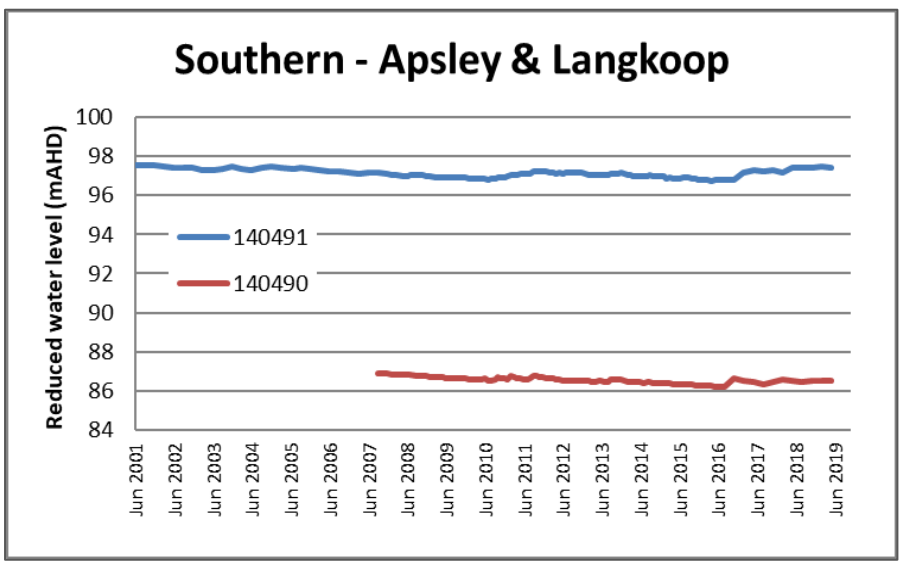
Summary of Groundwater Levels

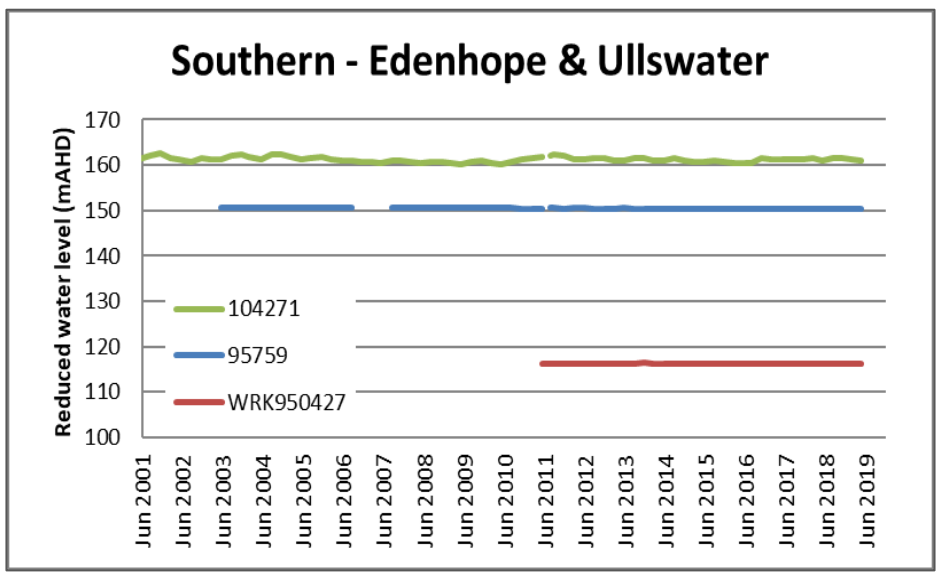


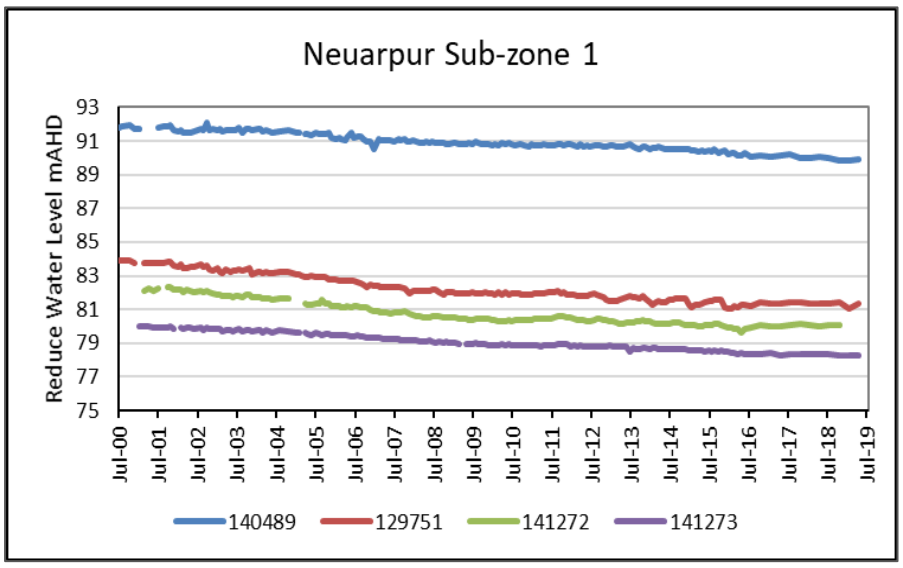


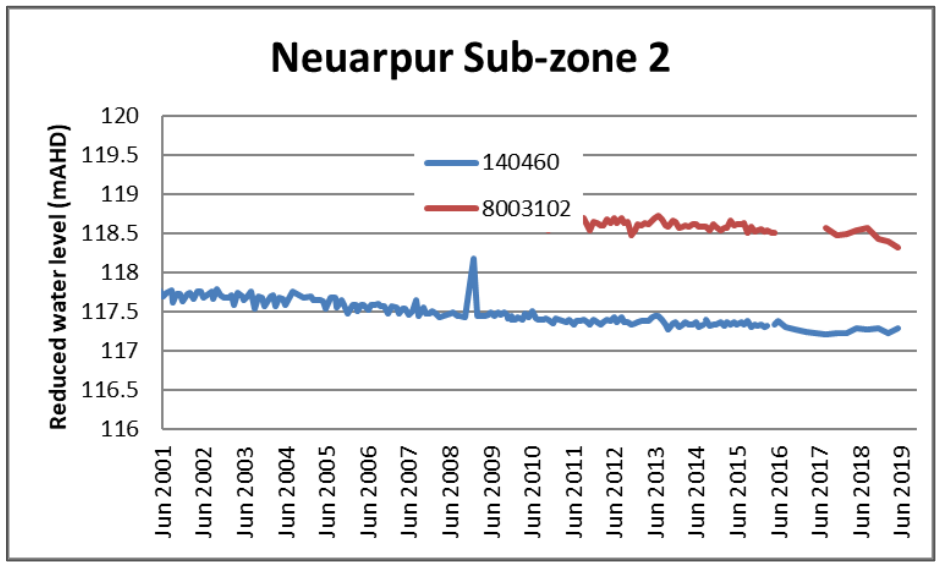






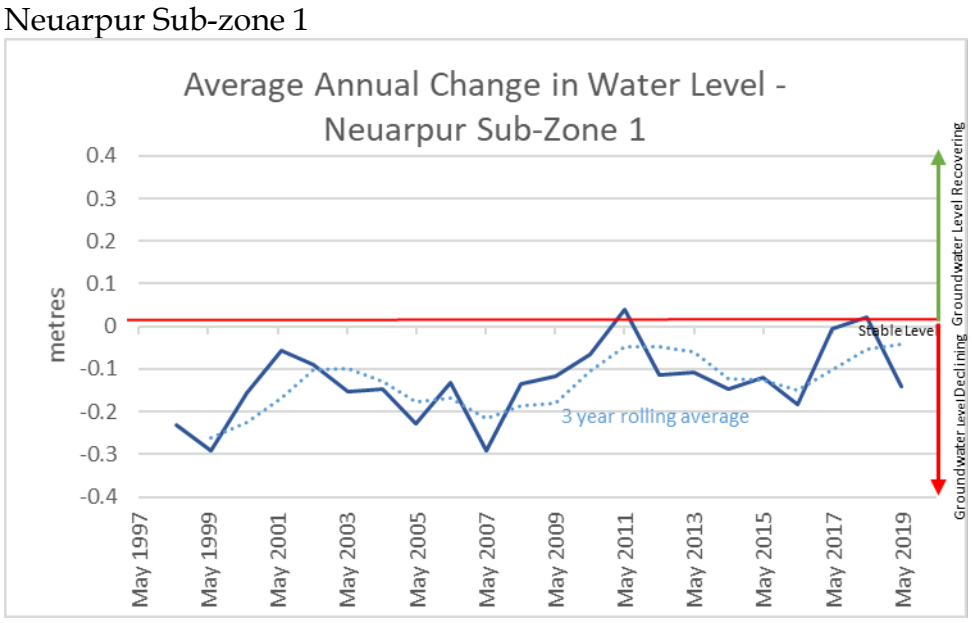


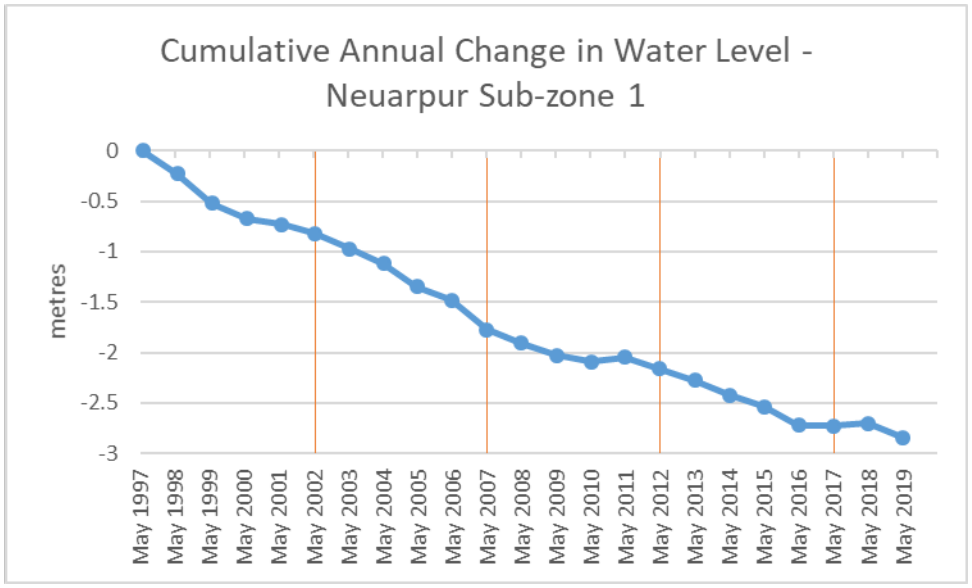




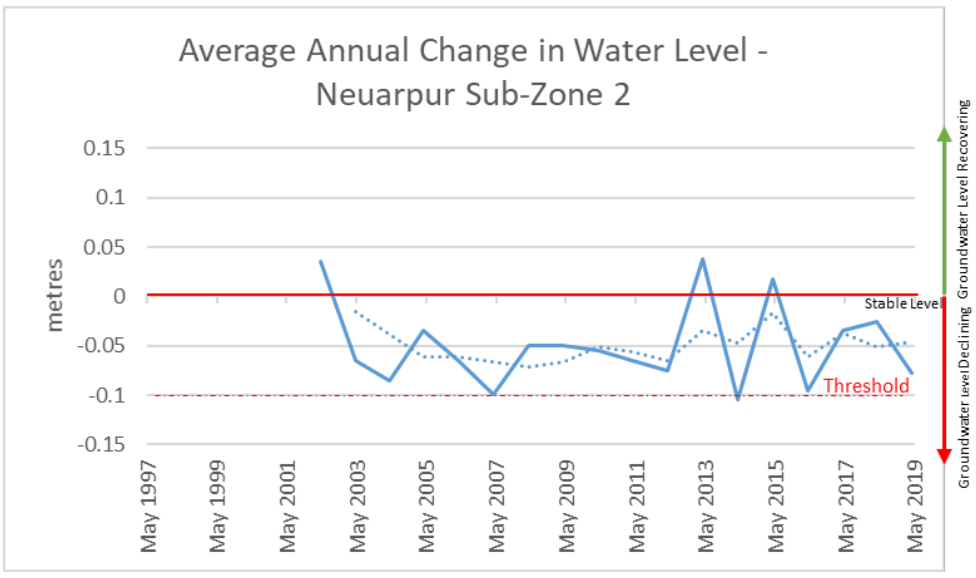
Yearly Trend Analysis - representative hydrographs for West Wimmera GMA zones and sub-zones

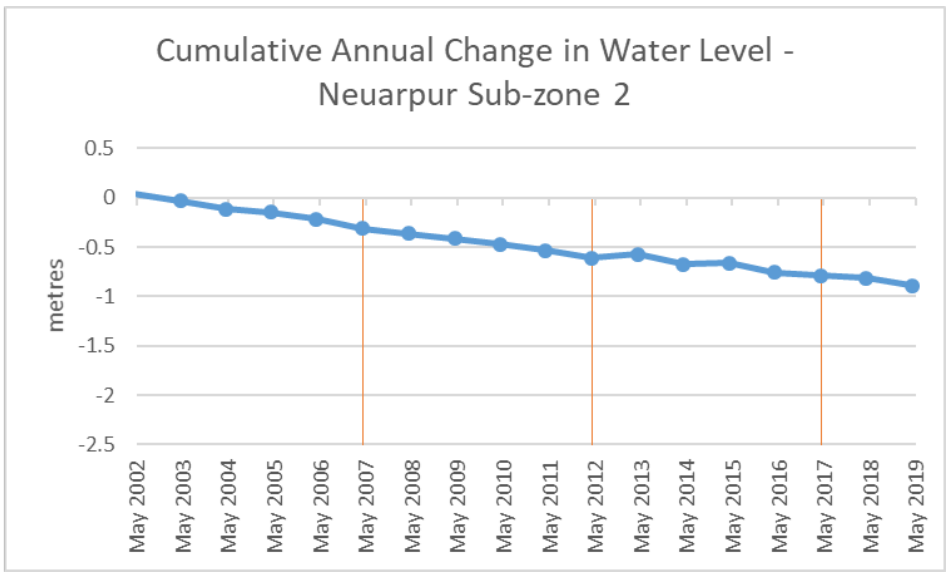
Neuarpur Sub-zone 1



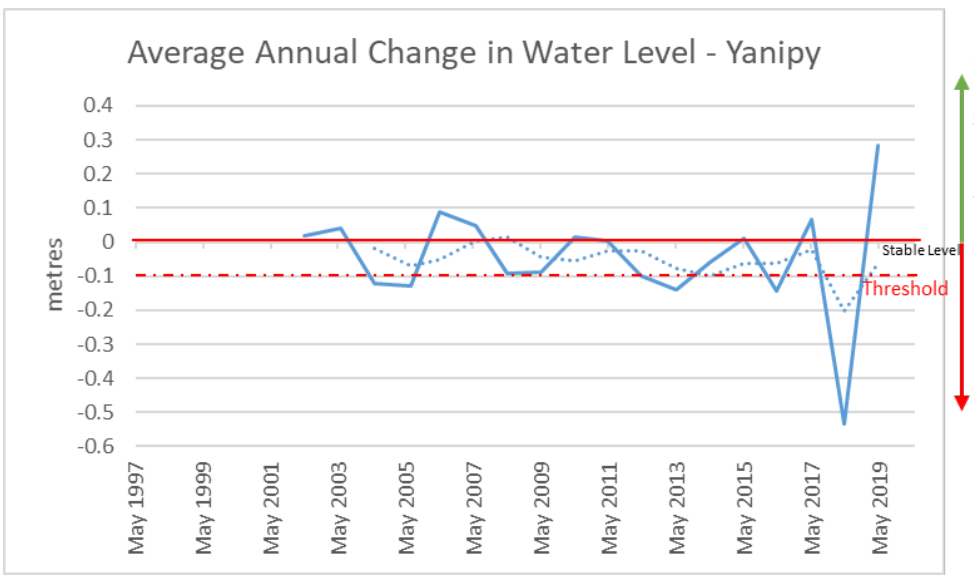


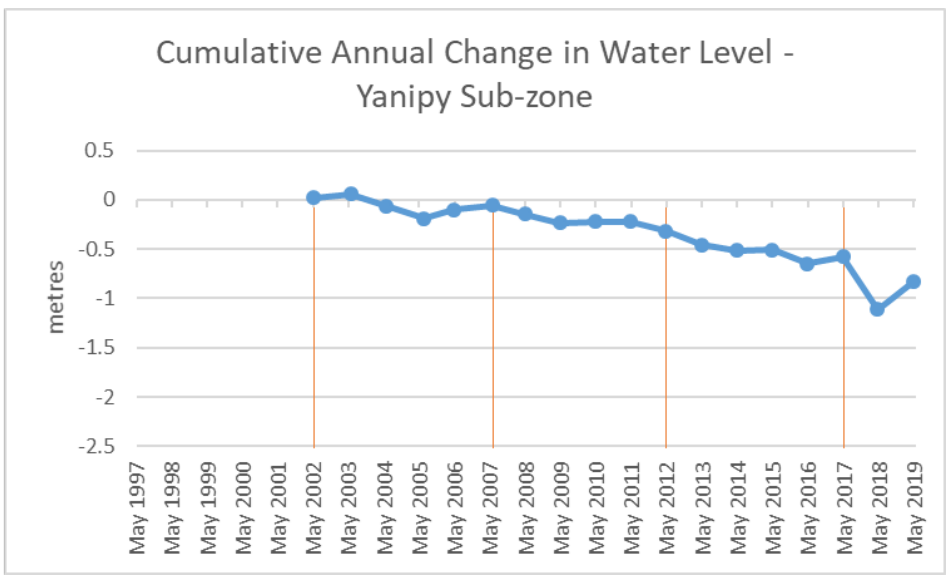
Neuarpur Sub-zone 2



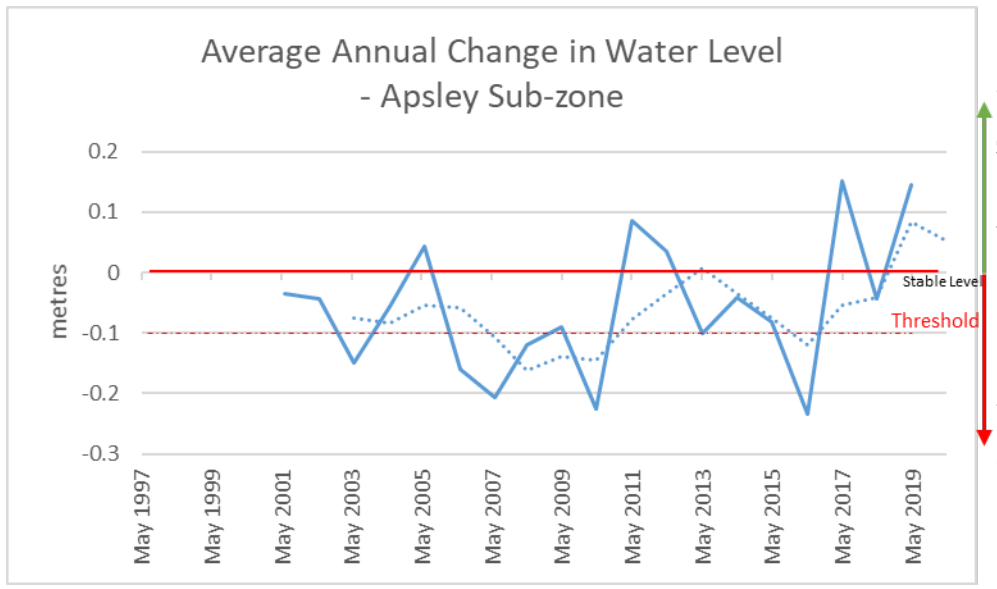


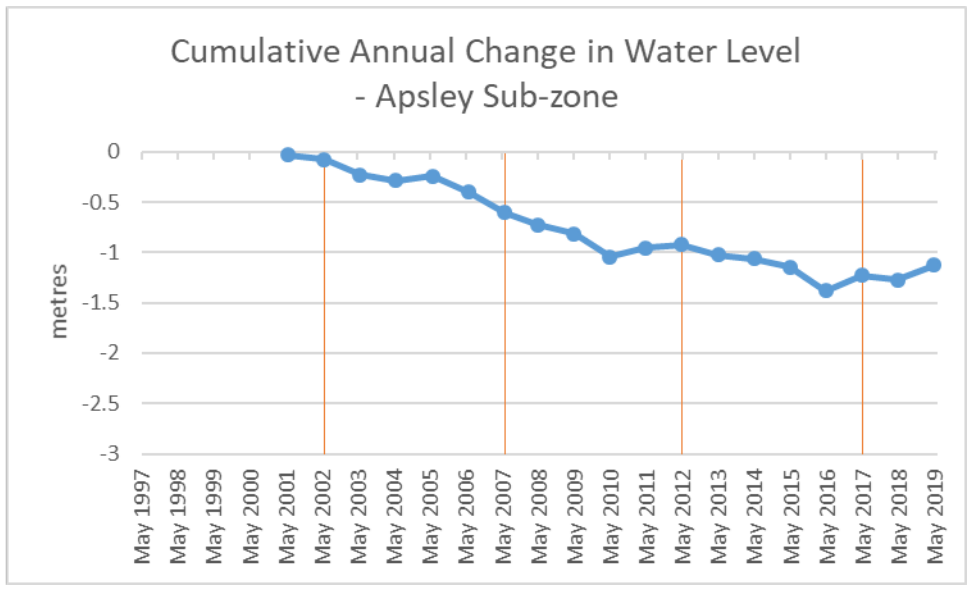
Yanipy Sub-zone



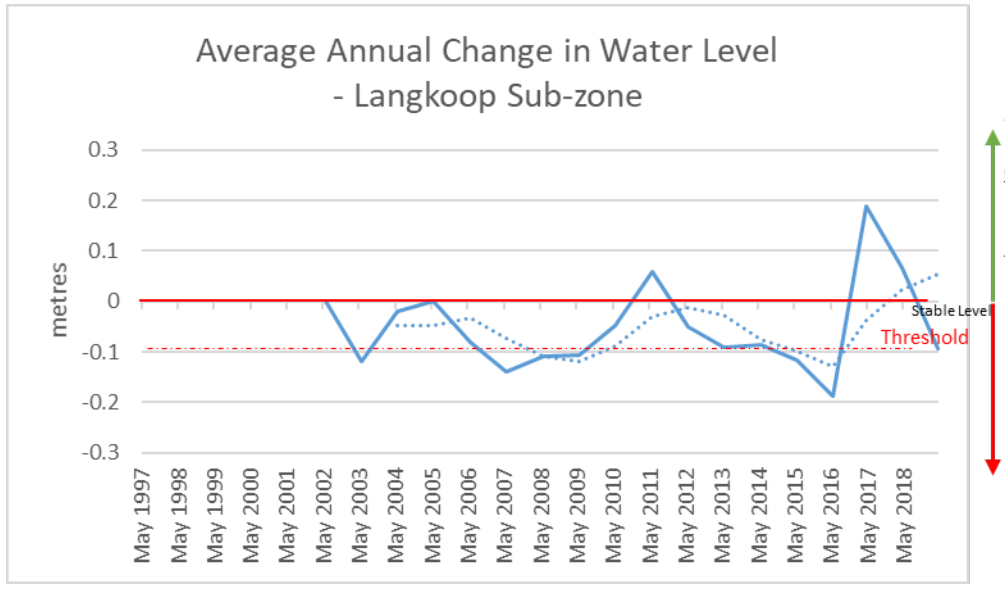


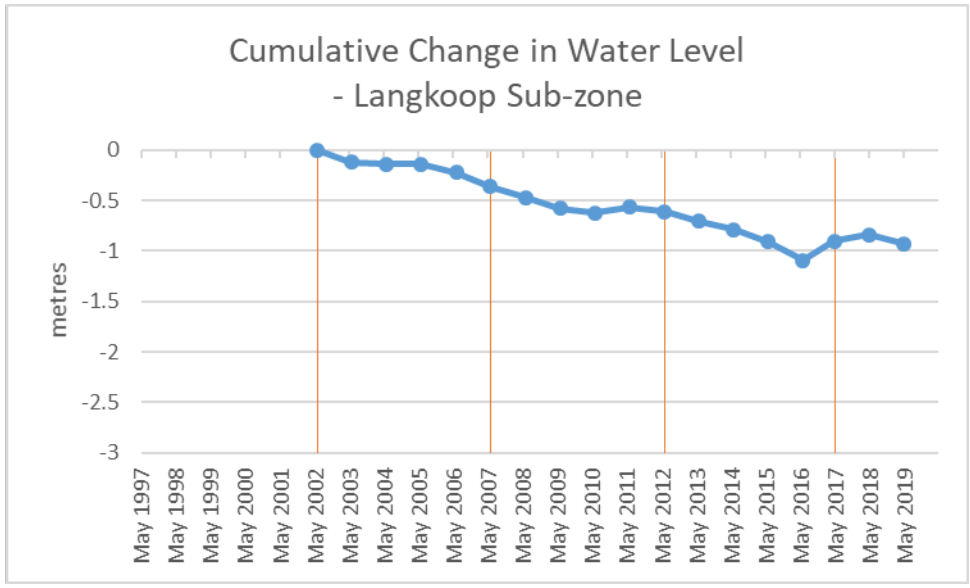
Apsley Sub-zone



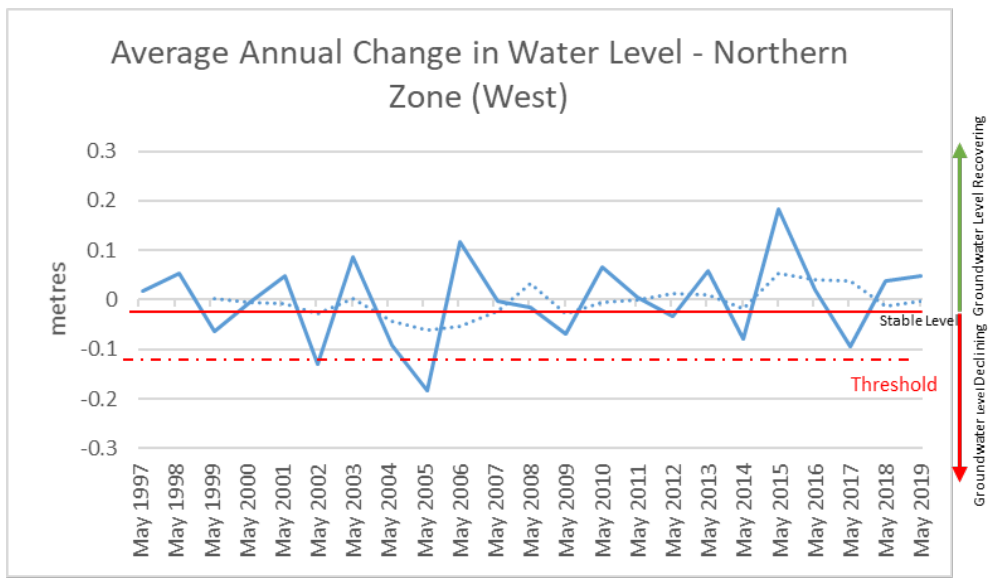


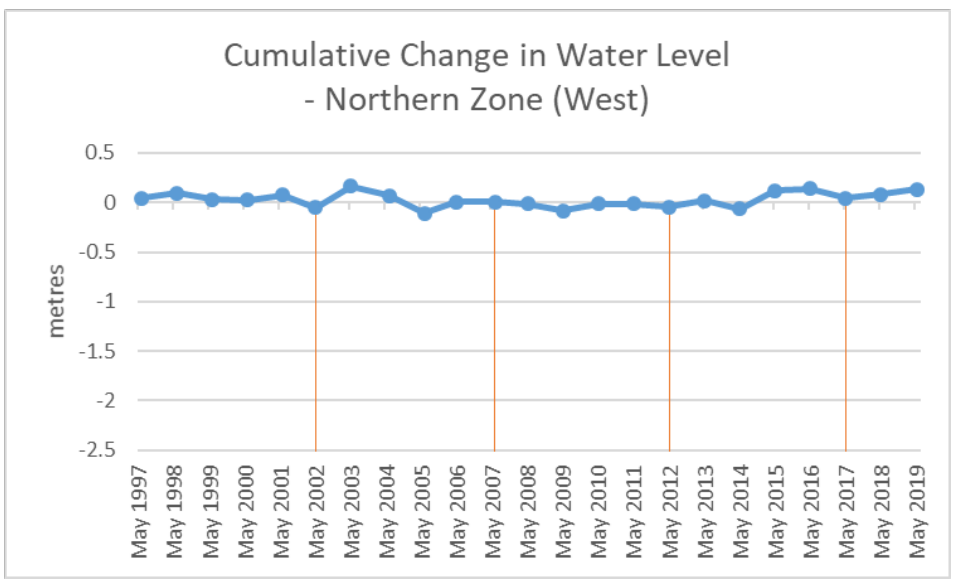
Langkoop Sub-zone



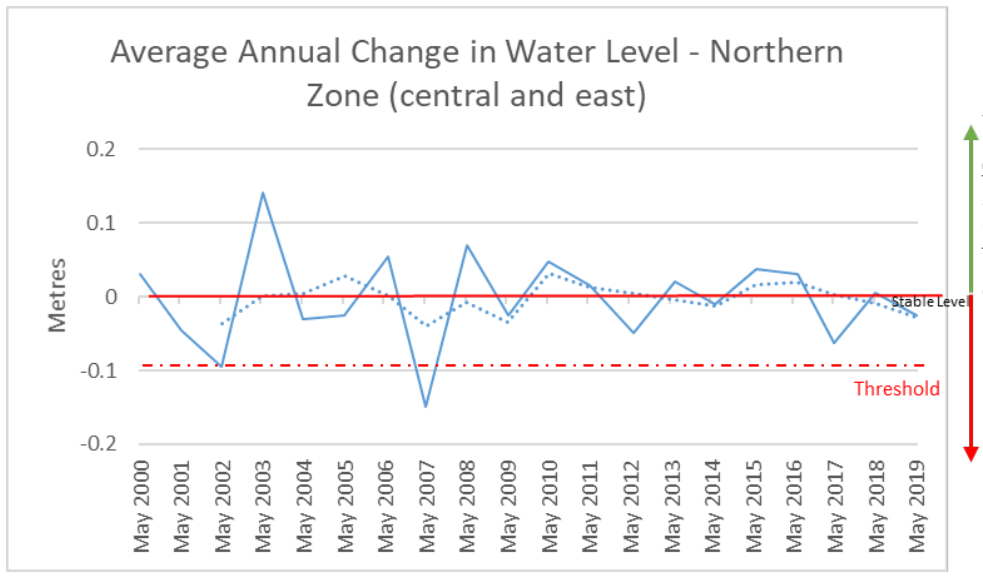


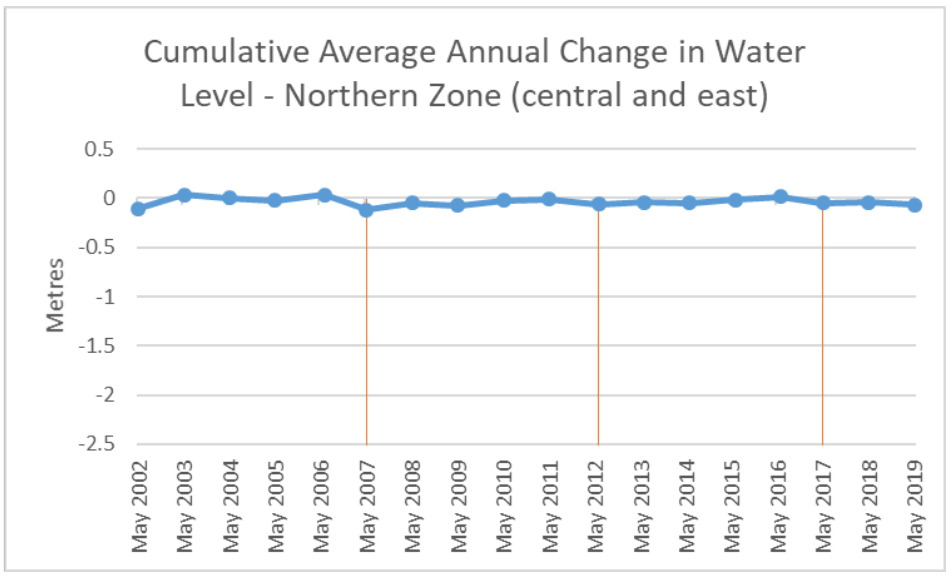
Northern Zone (west)



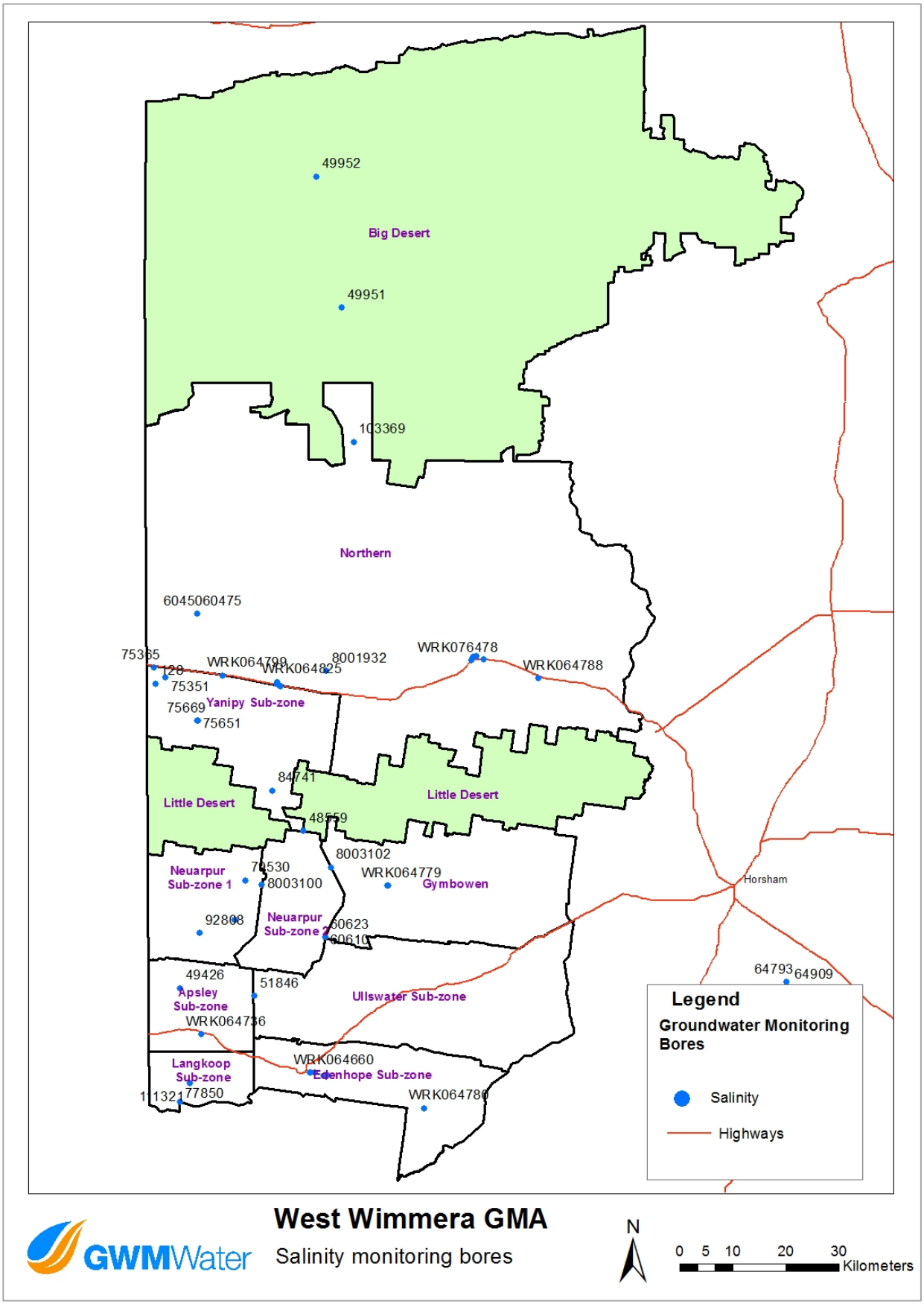
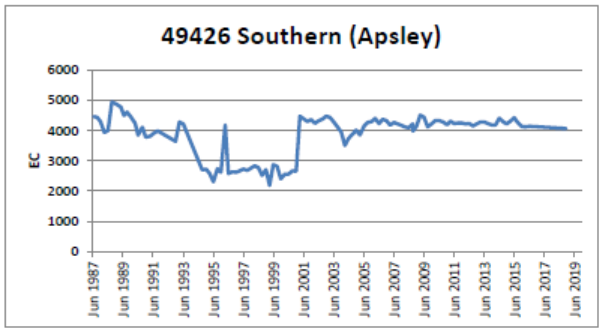
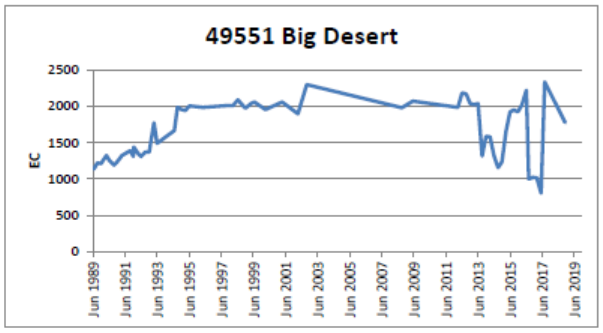
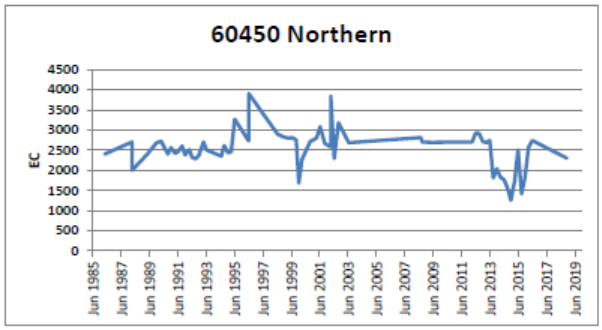
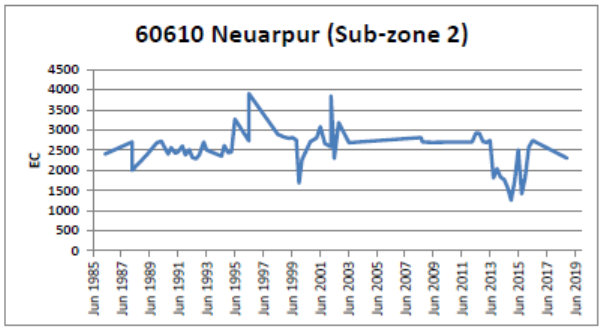
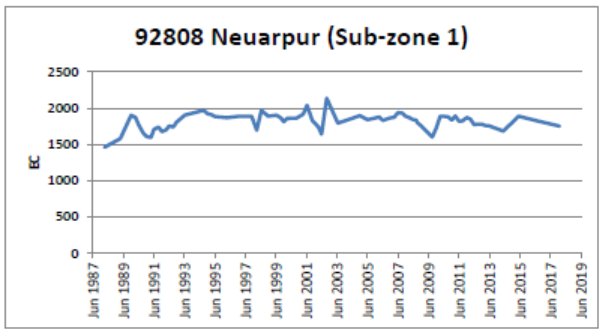
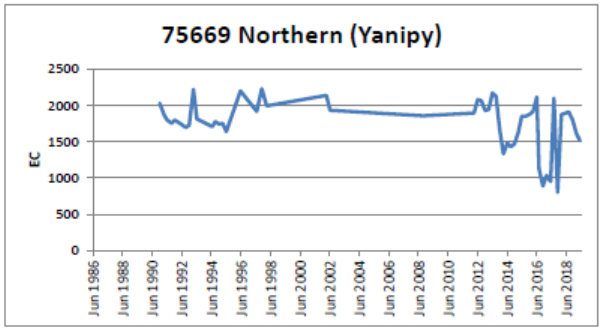
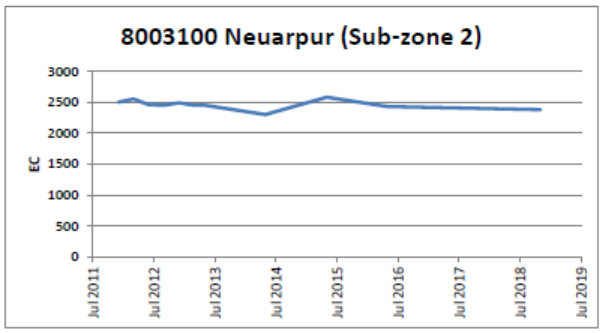
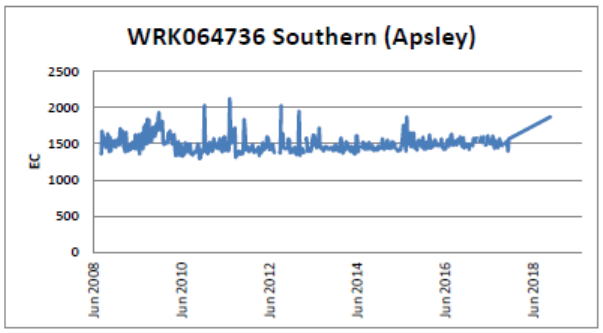
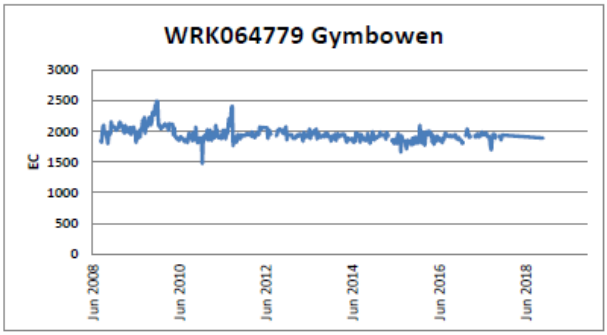
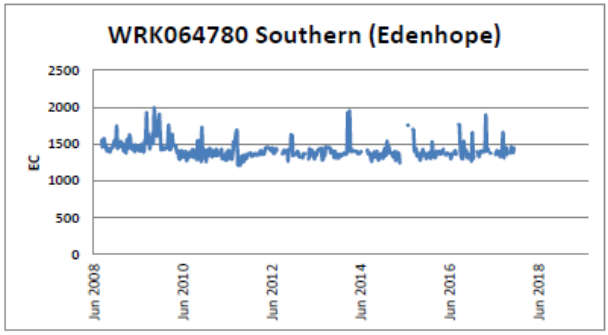


Northern Zone (central and east)





Appendix 2 - Salinity monitoring locations and results



Salinity monitoring bore data (selected sites)