Marne Saunders water management

Information Pack

Table of Contents

Marne Saunders water management

#1 History, licences & allocations

The Marne Saunders **Prescribed Water Resources Area (PWRA)** is located in the Murray-Darling Basin. It covers 743 km^2 and encompasses a wide range of climates, landforms, enterprises and water resources from the Eastern Mount Lofty Ranges down to the River Murray. The water resources of the area support a wide range of social, economic, environmental, and cultural values.

An information pack has been developed as an outcome of the Cambrai Water Forum in February 2022. There are 6 papers in the series as supporting information developed for the upcoming meetings in November 2022:

#1: History, Licences, and Allocations

#2: Hydrological cycle in the PWRA

#3: Water development and use

#4: Resource and ecosystem condition

#5: Frequently asked questions

#6: How to address concerns

Overview and history of the Marne Saunders PWRA

The Marne Saunders PWRA can be broadly divided into the hills zone (in the west, with high rainfall) and plains zone (in the east, with very low rainfall), as demonstrated in Figure 1 overleaf.

The Marne Saunders PWRA covers part of the traditional lands and waters of the Peramangk and Nganguraku people. The lower sections of the catchments are within the First Peoples of the River Murray and Mallee Region #2 Native Title Claim area.

Since prescription, a water allocation and licence is required for taking prescribed water resources within the PWRA for most types of use (including, irrigation, industrial use, intensive animal production, recreational use).

However, in the Marne Saunders PWRA, no licence or allocation is required for taking water for the following types of use:

- domestic use
- stock use (providing drinking water to stock that are not subject to intensive farming)
- a small group of exempted purposes, including non-commercial native title rights to take water. See section 1.4 of the Marne Saunders Water Allocation Plan (WAP) for more information on exempted purposes.

A history of key steps to the regulation of water taking in the Marne Saunders PWRA is provided in Table 1. This history is covered in more detail in section 1.4 of the Marne Saunders WAP:

Table 1: Key steps in the process of regulating taking of water in the Marne Saunders Prescribed Water Resources Area (PWRA).

When	Event
May 1999 February 2002	Temporary moratorium prohibiting water resource development in Marne catchment (1999) and Saunders catchment (2002).
March 2003	Prescription of the Marne Saunders PWRA.
March 2003	Permit required for water affecting activities like dam construction in the SA Murray-Darling Basin (now known as the Murraylands and Riverland region), following adoption of the River Murray catchment plan.
January 2010	Adoption of the Marne Saunders WAP.
2010	Water licences start to be issued to existing users in the Marne Saunders PWRA.
Spring 2017	On-ground implementation of Flows for the Future program starts.
February 2019	Amendments made to the Marne Saunders WAP to include Aboriginal water interests.
December 2019	Review of the Marne Saunders WAP.

Characteristics of water licences and allocations

A water licence in the Marne Saunders PWRA includes the allocation or maximum volume that can be taken by the licensee from each water resource, for each water use year (1 July – 30 June).

The licence also specifies the only sources that the allocation can be taken from (i.e. which wells, dams and/or watercourse diversions).

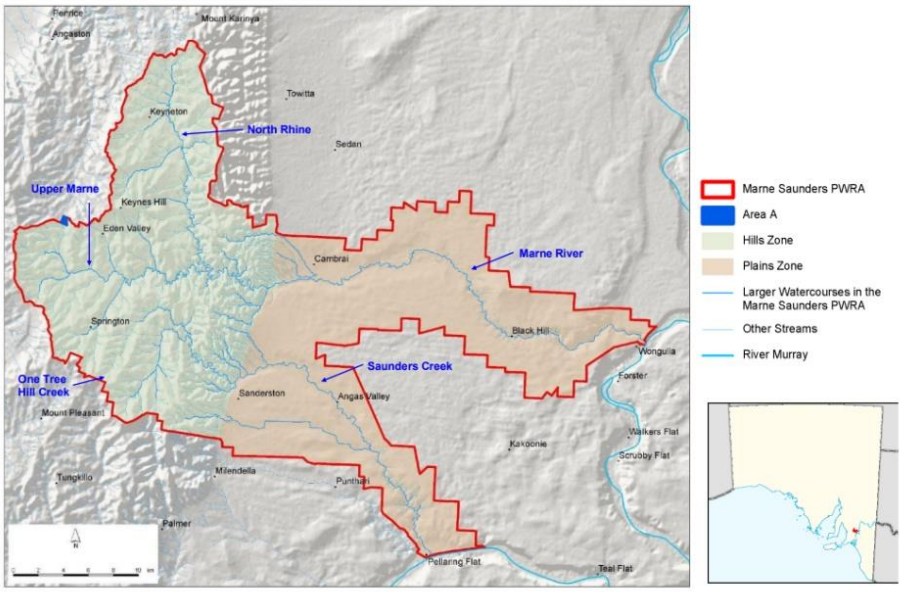

Figure 1 (right): The Marne Saunders Prescribed Water Resource Area. Orange shading = Plains Zone; Green Shading = Hills Zone

Water allocations and licences are personal property rights that are separate from land. This right to take water may be transferred or traded between users, subject to the rules set out in the water allocation plan and approval by the Minister for Climate, Environment and Water. An allocation can be transferred independently of a water licence. More information on rights to take and use water can be found on the Department for Environment and Water website: https://www.environment.sa.gov.au/topics/water/water-markets-and-trade/water-rights

It is important to note that having a water licence does not guarantee the ability to physically access the maximum allocation volume every year. Availability of water is influenced by climate, water movement and other demands.

It is also important to note that holding the right to take water does not automatically allow construction of an associated well or dam – this construction requires separate approval. For more information, see the section on '**Error! Reference source not found.**' in the information pack as factsheet #5 Frequently Asked Questions.

More information

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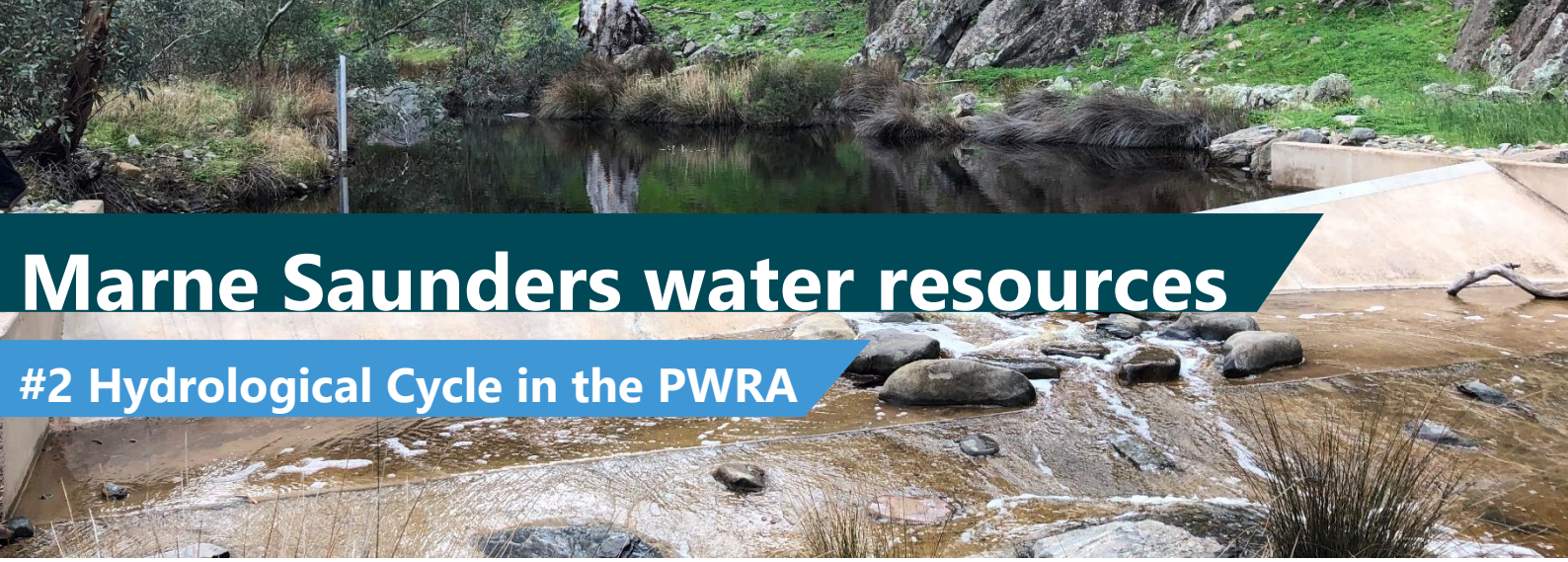
https://www.landscape.sa.gov.au/mr/water/water-allocation-plans/marne-saunders



Marne Saunders water resources

#2 Hydrological Cycle in the PWRA

Water resources in the Marne Saunders Prescribed Water Resources Area (PWRA) depend on rainfall which moves through the landscape along a variety of paths. Water resources are strongly interlinked across the area, and actions or changes in one resource can influence another.

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Overview of water resources and their connections across the Marne Saunders PWRA

The Marne Saunders PWRA can be broadly divided into the hills zone (in the west, with high rainfall) and plains zone (in the east, with very low rainfall), as demonstrated in Figure 1.

Water moves through the landscape along a variety of paths (Figure 2, overleaf). Rainfall is the ultimate source of water in the area. The majority of rainfall leaves the catchment via evaporation or from transpiration by plants.

Figure 1 (right): The Marne Saunders Prescribed Water Resource Area. Orange shading = Plains Zone; Green Shading = Hills Zone

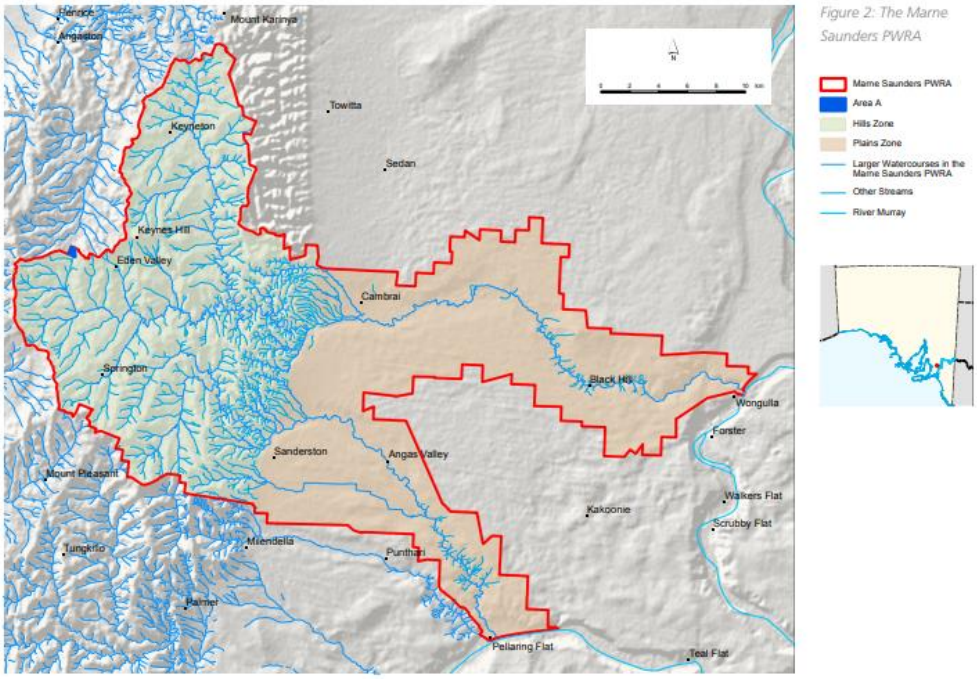
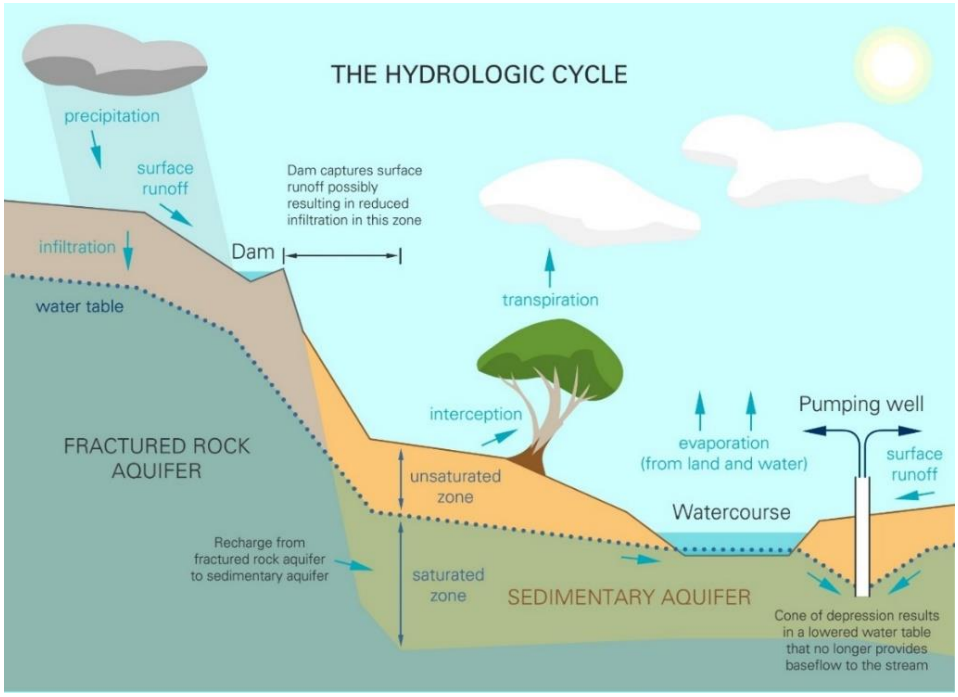


Figure 2: The Marne Saunders PWRA

Part of the rain that falls on the ground runs off the land as surface water and makes its way into watercourses. The Marne River and Saunders Creek begin in the high rainfall hills zone, flowing east down the hills, through gorges and then out onto the plains zone, to eventually discharge into the River Murray.



Rainfall and streamflow also seep down into the pores and cracks of water-bearing rock and sediment layers known as aquifers to become underground water (commonly referred to as groundwater). Underground water also flows from higher to lower level, with a general movement of underground water from west to east over the Marne Saunders PWRA.

Figure 2: Paths of water movement through the landscape. Figure courtesy of the former Department for Water, Land and Biodiversity Conservation (DWLBC), and Ecocreative

It is important to note that the different water resources in the Marne Saunders PWRA are strongly interlinked (Figure 2). Actions in one resource can influence another, so they need to be managed together. Surface water running over the land enters watercourses and becomes watercourse water. Underground water can also enter the watercourse as "baseflow" via springs and seeps. Flow in the watercourse can seep through the bed and replenish or "recharge" the underground water. Water can also move between aquifers.

The movement of water through the landscape can be interrupted by water resource development (including dams, weirs and wells), influencing the volume, water quality and pattern of water availability both locally and at the larger scale.

Water resources above ground

Rainfall, and therefore streamflow, is highly variable from year to year. Since 1973, when streamflow measurement began at the gauging station in the Marne gorge, annual streamflow in the Marne River has ranged from zero (in 2018-2020) to 33,500 megalitres (in 1974) (Figure 3, below). Most streamflow comes from the hills where rainfall is highest.

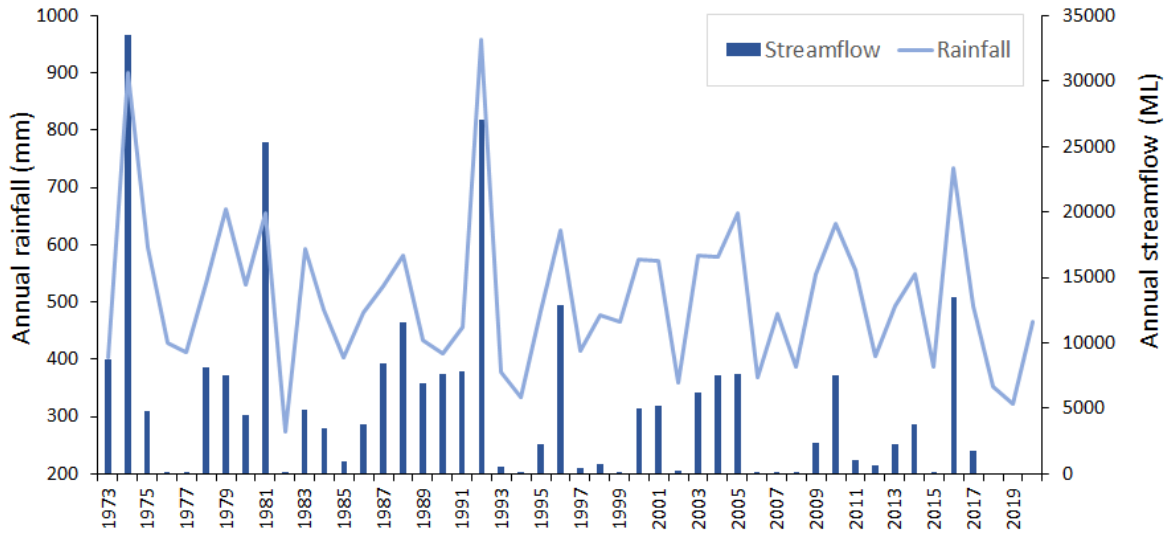


Figure 3: Annual rainfall (Keyneton) and streamflow (Marne gorge) for 1973 to 2020. Data courtesy of Department for Environment and Water.

Flows are strongly seasonal, reflecting the pattern of rainfall, although storm events occur from time to time in drier seasons. Zero flow conditions commonly occur in the drier months, although dry season pools are maintained in some areas by baseflow (inflow of underground water).

Baseflow to watercourses is known to occur throughout the hills and also in some plains locations, such as Black Hill Springs in the Marne River and near Lenger Reserve in Saunders Creek.

Local shallow aquifers in the Black Hill area are thought to be important contributors of the baseflow that maintains the Black Hill springs. Streamflow to the area is important to recharge these local aquifers, and requires a large amount of flow to traverse the stream across the plains. Analysis of flow monitoring data shows that at least 4,000 ML of cumulative annual flow at the Marne gorge is required before streamflow will reach Black Hill.

Water resources below ground

There are two main types of underground water aquifers in the Marne Saunders PWRA: the fractured rock aquifer in the hills and the sedimentary aquifers in the plains.

The fractured rock underground water in the hills generally flows to the east and recharges the sedimentary aquifers at the base of the hills (Figure 4, below).

There are three sedimentary aquifers on the plains, each at a different depth. Figure 4 shows the aquifers from shallowest to deepest:

- Quaternary aquifer
- Murray Group Limestone aquifer
- Renmark Group aquifer

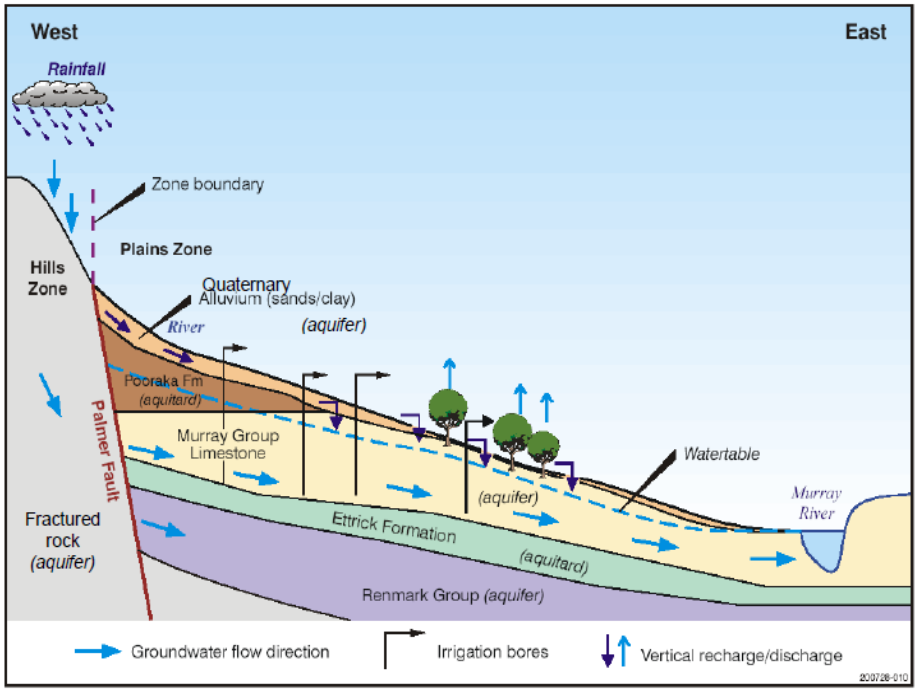


Figure 4: Cross section of key aquifer locations across the Marne Saunders catchment

Currently all licensed water use is from the Murray Group Limestone aquifer.

The limestone aquifer has two major sections: an unconfined section (open to the above soil layers and atmosphere via pores in the rock), and a confined section (covered by impermeable layers of clay deposited by the Pooraka Formation, Figure 4). The confined section of the limestone aquifer lies to the west of Cambrai, while in the east of Cambrai, the aquifer is unconfined (Figure 5, overleaf).

It is important to note that these two sections of the Murray Group Limestone aquifer are recharged by different sources. Streamflow is responsible for the majority of recharge in the unconfined limestone aquifer (east of Cambrai) with minimal recharge also being provided by the low amount of local rainfall.

Impermeable layers called aquitards (such as the Pooraka Formation) restrict streamflow from reaching some aquifers on the plains, such as the western confined section of the Murray Group Limestone aquifer; and the deeper Renmark Group aquifer. Both of these aquifers are thought to be recharged by underground water moving from the fractured rock aquifers of the hills zone, rather than by streamflow.

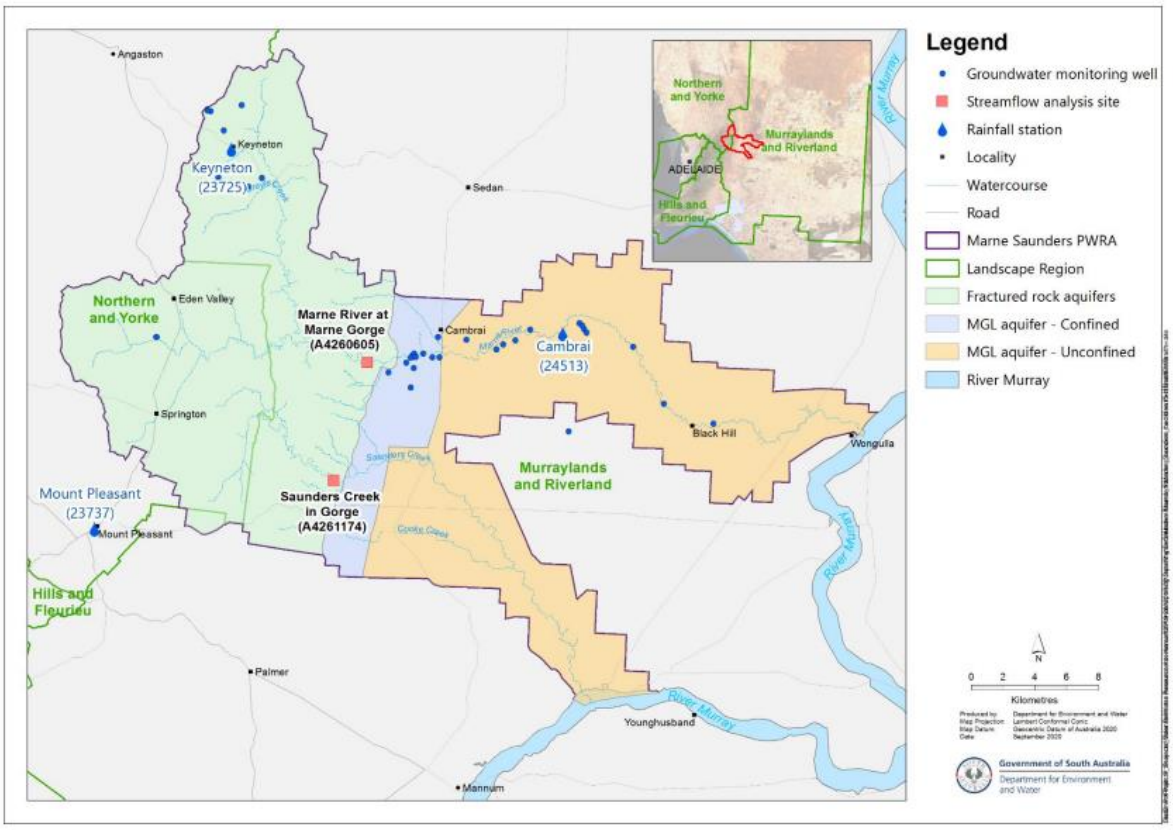


Figure 5: Aerial view of locations of the three key aquifers within the Marne Saunders PWRA: Green shading = Fractured Rock Aquifer; Purple shading = Confined Murray Group Limestone; Yellow shading = Unconfined Murray Group Limestone

More information

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Marne Saunders water resources

#3 Water development and use

Water supports a wide range of values in the Marne Saunders Prescribed Water Resources Area (PWRA). This includes cultural and social values across the community, as well as water-dependent ecosystems throughout the area, and provision of ecosystem services such as erosion management and nutrient cycling.

Water is taken for a range of purposes including domestic use and stock use, which do not require a water licence in the area. It is also taken for a variety of licensed purposes, including irrigation of a range of crops, industrial use, intensive animal keeping, and recreational use.

This information sheet provides a summary on wells, dams and watercourse diversions in the Marne Saunders PWRA, including current numbers and history of development. It also gives information on volumes taken from different water resources for different purposes.

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Wells: current number & history

Up to September 2022, over 1,460 water wells had been drilled in the Marne Saunders PWRA according to the state wells database. Of these, 456 wells are still considered operational, around 310 have been abandoned, backfilled or similar, and the status of the remainder is unidentified. Of the currently operational wells, 318 of these have been drilled for purposes including irrigation or industrial use, although wells may have changed purpose since originally drilled.

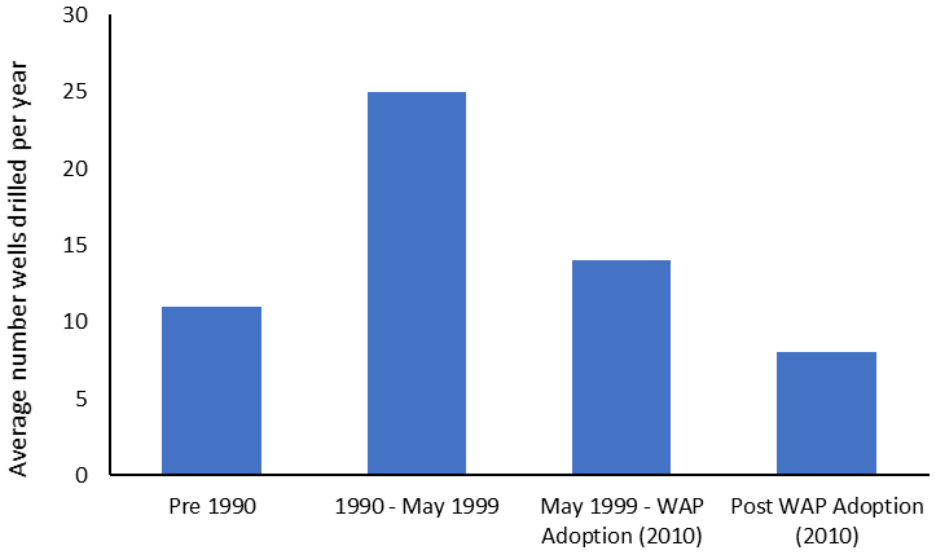

Figure 1: Average number of wells drilled per year in the Marne Saunders PWRA during the periods prior to, and following, moratoriums. Data obtained from the water drill holes database, maintained within DEW's Water Connect database

The rate of well drilling increased significantly in the years leading up to the moratoriums on water resource development in 1999 and 2002 (Figure 1, left). The year of well drilling can be established for around 1,380 of the wells in the area, and the oldest recorded well was drilled in 1909. As of September 2022, 179 wells access water for licensed purposes.

Dams: current number & history

The total dam capacity in 1991 in the Marne catchment was estimated at 1,123 ML. The current total dam capacity in the Marne is estimated at 3,225 ML. Dam capacity has not increased significantly since 1999 when the Notice of Restriction was placed in the area, meaning that dam capacity almost tripled in less than 10 years from 1991 to 1999. The Board is not aware of any approved increase in dam capacity since the requirement for a dam construction permit was introduced.

As of 2020, there are 964 dams across the Marne Saunders PWRA, 11% of which are licensed. The total estimated dam storage capacity is 3,779 ML, of which 56% is licensed dams.

It is important to note that the volume of dam storage capacity is not the same as the volume of use from dams, or a measure of the impact of dams on downstream flow. The amount of water taken by a dam will depend on the amount of runoff and use in the upstream catchment, the size of the dam, and how much water is already in the dam, which in turn is influenced by use and evaporation from the dam.

Watercourse diversions: current number

As of September 2022, there are 14 watercourse diversion points (e.g. pumps and weirs) where the water is used for licensed purposes. The number of watercourse diversion points for non-licensed use is not known.

How much water is taken?

Table 1 shows the annual volume of water measured or estimated to be taken in the Marne Saunders PWRA for licensed use and non-licensed (stock and domestic) purposes, from different water resources. The table also includes estimated annual values of evaporation from dams in the Marne Saunders PWRA.

Table 1: Annual volume of water taken from different water resources in the Marne Saunders PWRA.

Water resource and use type	Range of actual annual water use for 2010-11 to 2019-20 (ML/year)			Allocation limit (ML as of 2020/21)
	Average	Minimum	Maximum	
Underground				
Hills underground water				
Licensed use	387	136	610	1,976
Stock and domestic use	*NA			94
Plains underground water				
Licensed use	1,158	932	1370	2,088
Stock and domestic use	*NA			176
Surface water (including watercourses)				
Watercourse – licensed use (eg diversions)	50	5	115	179
Surface water – licensed use (eg dams)	403	179	638	1,276
Stock and domestic use (est.)	294	68	460	496
Dam evaporation (est.)	696	115	1081	Not applicable

Underground water

All underground water use volumes in Table 1 give separate values for the hills and plains zones. The licensed use data shows the range of annual metered usage available from the water resource status reports (2010-11 to 2019-20).

The allocation limit is the volume allocated as of 2020-21 (i.e. potential allowable maximum that could currently be taken). Stock and domestic use is not licensed or metered, so the allocation limit volume in the table is the estimated annual requirements from underground water for these purposes from the Marne Saunders WAP.

Surface & watercourse water

Table 1 shows the range of annual metered usage of licensed surface water and watercourse water available from the water resource status reports (2010-11 to 2019-20), with the allocation limt being the allocated volumes as of 2020-21 (i.e. potential allowable maximum that could currently be taken).

Stock and domestic use is not licensed or metered, so annual volumes of stock and domestic use of surface water for 2010-11 to 2019-20 have been estimated using surface water models. The allocation limit volume is estimated as 30% of the capacity of non-licensed (stock and domestic) dams in the PWRA, as given in the Marne Saunders WAP. These surface water models were originally built to support WAP development, and represent the pattern of dams, climate and water cycle parameters across the catchments. The models were used to estimate how much of the stock and domestic dams allocation limit value could have been used annually for 2010-11 to 2019-20, given the climate, upstream runoff and upstream use for each dam.

It is important to note that water may also be lost from dams by evaporation and seepage, which may be considered another form of surface water 'use'. Table 1 includes estimates of net annual evaporation from all dams, estimated for 2010-11 to 2019-20 via the above surface water models.

New development

Wells & bores

Permits may be granted for new wells or bores drilled for stock and domestic use and for licensed use, subject to a range of rules in the water allocation plan including buffer zones that generally can't be overlapped around existing wells and water-dependent ecosystems. These buffer zone rules don't apply to deepening an existing well, provided this doesn't cause the well to go into a different aquifer.

Dams

No new net dam capacity can be built under the rules of the Marne Saunders WAP. That is, approval will not be granted for new dam capacity, unless enough existing dam capacity has been removed beforehand (between 100-125% of dam capacity to be constructed). This requirement applies to new dams and enlargement of existing dams. This requirement also applies regardless of what the water will be used for (i.e. whether for licensed, stock and/or domestic use).

If sufficient dam capacity has been removed to allow construction of new dam capacity, then the construction will only be approved subject to a range of other rules in the water allocation plan. These rules aim to minimise the impact on other users, including ecosystems.

Note on dam removal

A permit is also required for removing a dam or reducing its volume. If a dam is removed or its volume is reduced for the purpose of providing environmental benefit, then the current Marne Saunders WAP does not allow that removed capacity to be reconstructed.

Watercourse diversions

A water affecting activities permit is required to construct a new watercourse diversion structure. The application would be assessed against the relevant rules in the Marne Saunders WAP, which includes provisions to minimise the impact of the construction on other users, including ecosystems. More information on water affecting activities can be found on the Boards website: https://www.landscape.sa.gov.au/mr/water/managing-water-resources/water-affecting-activities

Further information

Key information listed in the dot points below can be found in:

- Water Allocation Plan (WAP) for the Marne Saunders
- 2009 Guide to the draft Water Allocation Plan – a guide for consultation

- Outline of the WAP's key rules for well drilling and dam construction:
  - WAP - section 4.3
  - Guide - section 5

- The rules for well drilling and dam construction:
  - WAP sections 8.3 and 8.5

- Estimates of stock and domestic water use:
  - WAP section 4.1.2.1

More information

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Marne Saunders status update

#4 Resource & ecosystem condition

Monitoring for stream flow and its salinity, and underground water level and its salinity, occurs at several sites throughout the Marne Saunders Prescribed Water Resources Area (PWRA). This includes flow gauging stations operated by the Department of Environment and Water (DEW) and the Murraylands and Riverland Landscape Board, regular bore monitoring by DEW, and provision of underground water samples by licensees for salinity testing.

The health of water-dependent ecosystems is monitored through annual citizen science Bioblitz water bug surveys; annual surveys of fish populations by the Murraylands and Riverland Landscape Board; and monitoring by the EPA to inform aquatic ecosystem condition reports.

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What is happening with surface water and groundwater?

DEW assesses the status of surface water and underground water resources in the Marne Saunders PWRA each year. The latest observations of groundwater level and stream flow from 2019-20 were either very much below average, or the lowest on record.

A summary of the 2019-20 status report for surface water and groundwater is reproduced overleaf. The full report, and reports from previous years, can be found on the WaterConnect website:

https://www.waterconnect.sa.gov.au/Content/Publications/DEW/Marne_Saunders_2020_Technical_Note.pdf

Marne Saunders Prescribed Water Resources Area

2019–20 surface water and groundwater status overview

Marne Saunders PWRA	Fractured rock aquifers
	Murray Group Limestone
	Surface water

LEGEND

- Highest on record
- Very much above average
- Above average
- Average
- Below average
- Very much below average
- Lowest on record
- Long-term trend

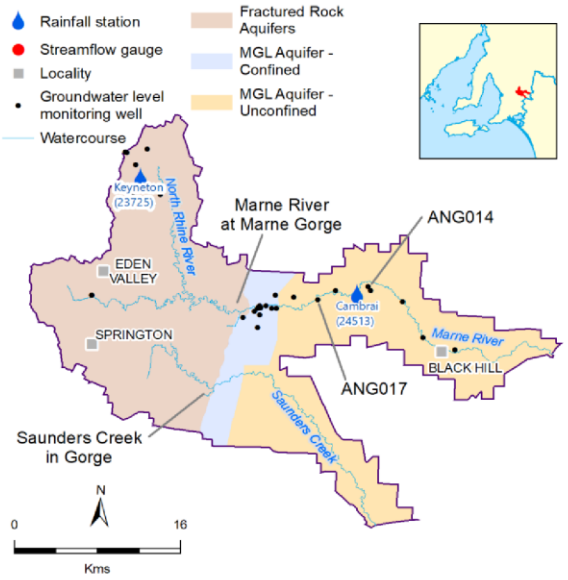
Regional context

The Marne Saunders PWRA relies on both surface water and groundwater resources which are managed under a Water Allocation Plan (WAP) adopted in 2010.

The PWRA is located in the Murray-Darling Basin. It is characterised by high rainfall in the hills and valleys of the ranges to the west, while the east is largely defined by gently undulating plains with rocky outcrops and very low rainfall.

The main watercourses within the PWRA are the ephemeral Marne River and Saunders Creek, which have their headwaters in the Mount Lofty Ranges.

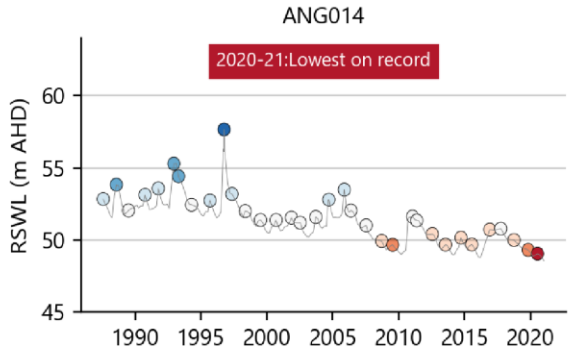
Groundwater is located in two types of aquifer: fractured rock aquifers found in the ranges to the west and the sedimentary Murray Group Limestone aquifers occurring beneath the Murray plains.



Groundwater level

56% of monitoring wells show 'Lowest on record' groundwater levels

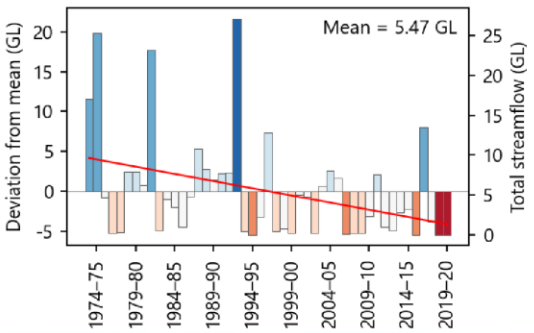
- Water levels in the fractured rock and Murray Group Limestone aquifers are classified from 'Below average' to 'Lowest on record' compared to their historical record.
- 56% of the monitoring wells (9 of 16) show lowest water levels on record in 2019–20, when compared to their respective historical record.
- Five-year trends in water level indicate that the majority of monitoring wells (92%) are declining.
- The figure below shows long-term groundwater levels at a monitoring well located near the Marne River (see map).



Streamflow

Streamflow was 'Lowest on record' for the 2 principal gauging stations in the PWRA

- Two principal streamflow gauging stations operational in the Marne Saunders PWRA recorded the below-average streamflow during 2019–20 (Marne River data presented below).
- The Marne River streamflow gauging station has not recorded any streamflow since November 2017. 10 ML of flow was recorded in the Saunders Creek in 2019–20.
- The data show a long-term declining trend in streamflow.

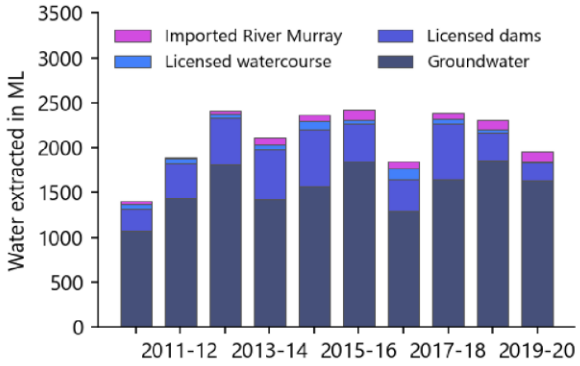


Government of South Australia
Department for Environment and Water

Water use

Water use in 2019–20 was 2454 ML with 1632 ML of this total extracted from groundwater, 822 ML from surface water sources (209 ML from licensed take and 496 ML of estimated demand from non-licensed sources) and 117 ML imported from the River Murray

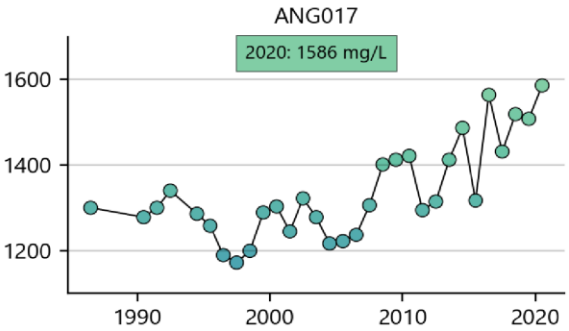
- Water sources include watercourses, farm dams, groundwater and imported water from the River Murray for municipal water supply and irrigation.



Salinity

In 2020, groundwater salinity from 76 wells ranged from 465 to 7387 mg/L with a median of 1810 mg/L

- Eight-year salinity trends in the fractured rock aquifers are decreasing in most wells (66%). The change in salinity over the eight-year period varies from a decrease of 6.34% per year to an increase of 1.04% per year, with a median rate of 0.27% decrease per year.
- Eight-year salinity trends in the Murray Group Limestone aquifer vary from a decrease of 5.99% per year to an increase of 7.93% per year, with a median rate of 0.02% increase per year.
- The figure below shows increases in salinity over the past 30 years at a monitoring well located east of Cambrai.



- No salinity values were recorded in the Marne River or Saunders Creek due to insufficient flow in 2019–20.

Climate-driven trends in water resources

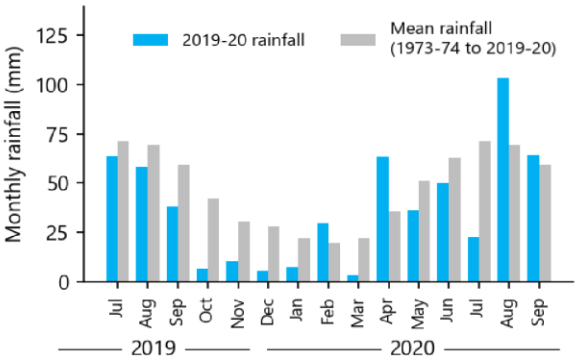
Climate is one of the main drivers of trends in the local water resources. Surface water and groundwater resources in the Marne Saunders PWRA are highly dependent on rainfall.

Below-average winter rainfall results in a reduction in annual streamflow volumes. Below-average summer rainfall can increase the need for irrigation and therefore lead to higher water extraction. This can in turn lead to an increase in salinity. Conversely, increased rainfall results in increased surface water availability, decreased irrigation extractions, with potential decline or stabilisation of salinity.

Below-average rainfall also results in reduced recharge to shallow aquifers. Together with increased water extractions can cause groundwater levels to decline even in deeper confined aquifers. Conversely, above-average rainfall can cause increased recharge and lower irrigation extraction, which can cause groundwater levels to increase.

Rainfall was below-average for 2019–20

- Rainfall typically ranges from 280 mm/y on the Murray Plains at the eastern boundary of the PWRA to 800 mm/y across the higher elevations at the western boundary.
- Rainfall across the region was below-average in 2019–20.
- Rainfall at Keyneton was 373 mm in 2019–20, 27% below-average, while rainfall at Cambrai was 192 mm, 33% below average. This pattern was consistently observed across the PWRA (data for Keyneton presented below).
- Below-average rainfall was observed throughout 2019–20 with very dry conditions experienced in the spring and summer of 2019–20.
- Long-term data trends indicate declining rainfall (1973–20).



More Information

This fact sheet is a high level summary of information provided in the 2019–20 Water Resources Assessment for the Marne Saunders PWRA. Full details of the assessment can be found at: https://www.waterconnect.sa.gov.au/

Government of South Australia
Department for Environment and Water

What is happening with water-dependent ecosystems?

A 20 year review has recently been done of fish monitoring data from 2001-2021 across the Marne Saunders PWRA, including links with water quality and flow data.

The review found there has been a decline in the condition of fish populations over that time at most sites. This decline includes a reduction in the number and distribution of fish in the hills, and increasing dominance of generalist and introduced fish species in the plains. Of particular concern is the threat of local extinction of the river blackfish population in the lower Marne at Black Hill Springs, which could occur in the near future.

The review analysed data on water salinity and key measures of the stream flow pattern, including modelled flow data that removes the effects of dams. This analysis suggests that an important contributor to the decline in fish populations is a reduction in flow (e.g. fewer days of stream flow, and fewer pulse flows or freshes at important times of year) and increasing salinity. The analysis showed that the reduction in flow is due to surface water capture by dams, and reduction in rainfall over the review period, particularly in the hills zone where most of the stream flow is generated.

A primary threat to fish populations in the hills zone is the increased drying out of waterways, leading to direct extermination of fish when refuge pools dry up. Waterways drying out also reduces connection between habitats across the hills, which reduces the ability of fish to recolonise areas.

The primary threat to the river blackfish population in the plains zone appears to be increasing salinity preventing successful breeding and survival of young fish (Figure 1, right). This may be due to the lack of large flow events in the last few years that flush the pools and bring fresh recharge to the local underground water.

These findings from the fish review align with local observations and previous reports on the reduction of the extent of permanent water in the lower Marne around Black Hill, and poor condition of river red gums that are also dependent on high flow events for watering and groundwater recharge.

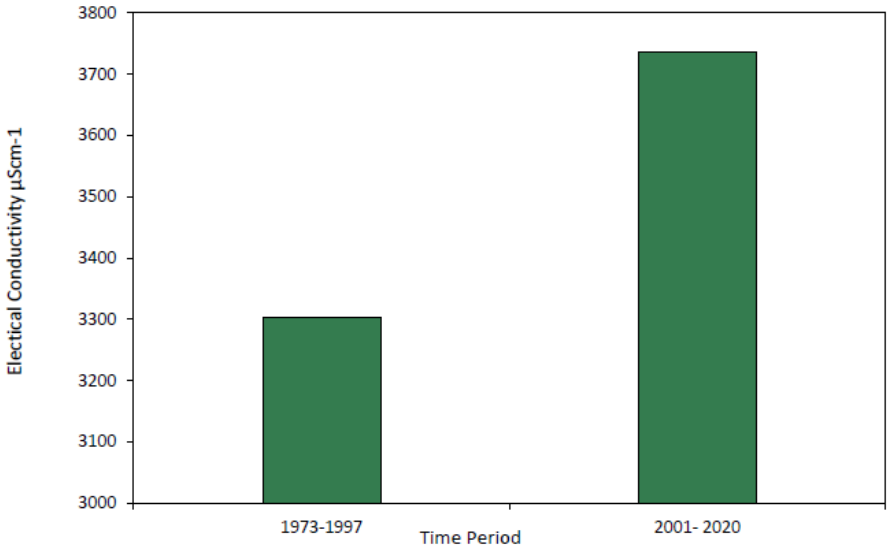


Figure 1: Mean annual salinity (as Electrical Conductivity EC) for years 1973-1997 Marne River at Cambrai and 2001–2021. Figure adapted from Whiterod et. al (2021), Nature Glenelg Trust.

Further information:

For more information on water resource and ecosystem monitoring please refer to:

- Monitoring data for surface water and underground water: www.waterconnect.sa.gov.au
- Surface water and groundwater annual status reports: https://www.waterconnect.sa.gov.au/Systems/GSR/Pages/Default.aspx
- EPA aquatic ecosystem condition reports: https://www.waterconnect.sa.gov.au/Systems/EPAWQ/SitePages/Home.aspx
- Citizen science monitoring: www.landscape.sa.gov.au/mr/get-involved/citizen-science/water-monitoring
- 20 year review of the status of water resources and fish communities within the Marne Saunders PWRA: https://cdn.environment.sa.gov.au/landscape/images/20-YEAR-REVIEW_FISH_MarneSaunders-PWRA_Whiterod-et-al_FINAL_2021.pdf

More information

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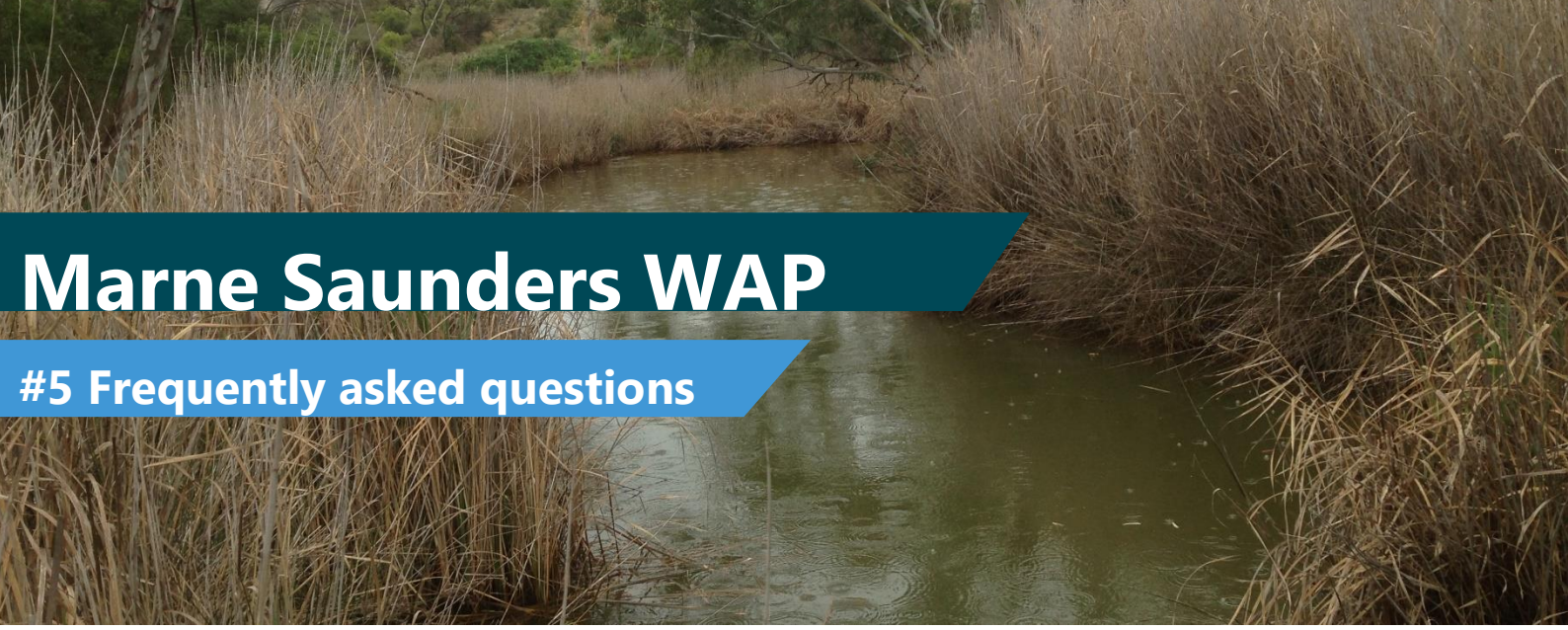
https://www.landscape.sa.gov.au/mr/water/water-allocation-plans/marne-saunders



Marne Saunders WAP

#5 Frequently asked questions

The Marne Saunders Water Allocation Plan (WAP) aims to support ecologically sustainable development and support a balance between social, economic, and environmental water needs. The plan establishes the rules for:

- new allocations in management zones where there is water available within water use limits, after allocations have been made to existing users.
- ongoing management of allocations, such as water use efficiency and rollover of allocations from year to year.
- transfer or trade of allocations between users.
- assessment of water affecting activity permits for activities such as dam construction and works in and around watercourses; assessment of drilling or deepening wells
- monitoring and reporting requirements.

An information pack has been developed as an outcome of the Cambrai Water Forum in February 2022. There are 6 papers in the series as supporting information developed for the upcoming meetings in November 2022:

#1: History, Licences, and Allocations

#2: Hydrological cycle in the PWRA

#3: Water development and use

#4: Resource and ecosystem condition

#5: Frequently asked questions

#6: How to address concerns

What does the current WAP aim to achieve?

Section 1.1 of the Marne Saunders WAP sets out the objectives for the plan. Central to the water management framework in the WAP are the requirements to balance water demands within the supply and capacity of the water resources. As outlined in section 4.3.1 of the plan, the approach is to:

- Assess the supply of water likely to be available for at least the life of the plan, based on previous water resource behaviour and patterns
- Set aside environmental water provisions
- Set aside non-licensed water needs (primarily stock and domestic use)
- Share remaining available water for licensed consumptive use

Does the current WAP consider climate change?

The current Marne Saunders WAP does not directly include the potential impacts of climate change. According to the Marne Saunders WAP section 4.3.1.1:

Much of the work to set allocation limits and associated policy for this Plan is based on historical data on resource supply, particularly from the last 30 or so years. This period includes a range of wet and dry years. The climate is quite variable from year to year and also shows patterns of wetter and drier periods. Future climate and hence water availability may not reflect historical patterns.

…

At present [as of WAP adoption in 2010] there is considerable uncertainty about the quantum of climate change likely to be experienced and its impact on water availability and demand. Therefore the potential impacts of climate change have not been incorporated into this Plan, and it is expected that this will be reviewed in future plans when better information is available.'

In the face of this uncertainty, the existing user licensing process and the WAP took a conservative approach to water allocation by:

- Reducing allocations to existing users in areas where entitlements exceeded the sustainable water use limits
- Establishing that no new allocations will occur in areas at higher risk, and no new net dam capacity can be constructed
- Encouraging adherence to the 'securing low flows' policy which requires low flows, when they occur, to be passed by priority dams and watercourse diversions.

Are Aboriginal water interests included in the current WAP?

The 2010 Marne Saunders WAP did not include Aboriginal water interests but it was updated in 2019 to include information on Aboriginal water interests which was incorporated via consultation with Peramangk, Nganguraku and Ngadjuri First Nation groups. The Murraylands and Riverland Landscape Board (the Board) is committed to engaging with First Nations on water planning and work towards achieving First Nations objectives and outcomes together.

For Aboriginal nations, all water is cultural water – this includes water for spiritual, cultural, environmental, social, and economic purposes. Water is life – it provides life to everyone and everything that ever lived, and everyone and everything that will ever live. In this way, water is the lifeblood of the landscape and is connected to all the other elements of the landscape, supporting a wide range of spiritual, cultural, environmental, social and economic activities. Water and all of the connected elements must be managed as parts of the same living body of the landscape, to allow it to remain healthy and continue to function and support people to live, as it has for many thousands of generations.

How does the water allocation plan manage the different water resources across the area?

The Marne Saunders PWRA has been divided into a series of management zones that reflect:

- different water resources (surface water + watercourse water and groundwater)
- different parts of water resources (e.g. different types of aquifers)

Management zones are managed as independent units in the plan, each with its own limits and rules (Figure 1). Consideration has been given to the linkages between management zones when developing the management approach for each of one of these zones.

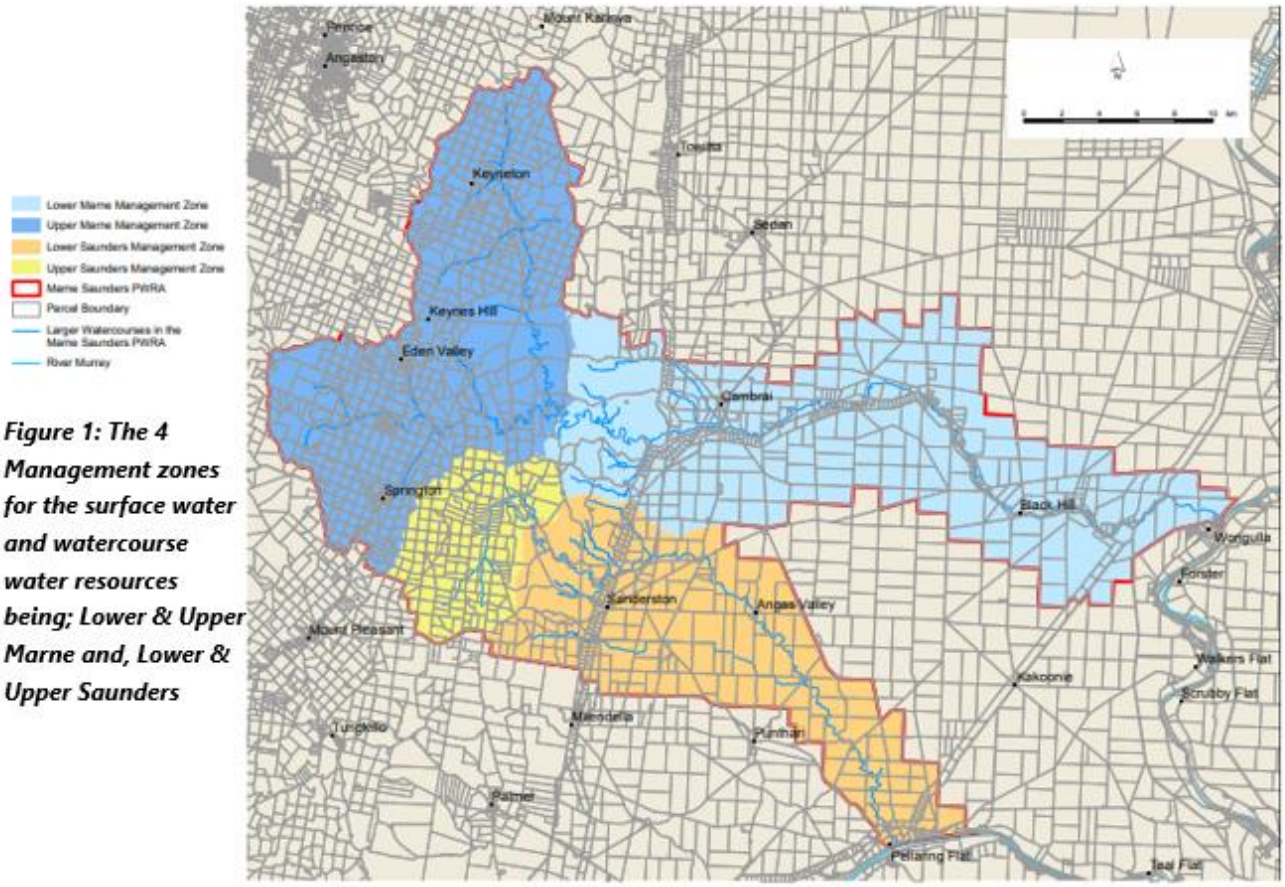


Figure 1: The 4 Management zones for the surface water and watercourse water resources being; Lower & Upper Marne and, Lower & Upper Saunders

The boundaries of **underground water management zones** are defined by the type of aquifer (e.g. fractured rock, confined / unconfined limestone), and by the primary source of recharge (e.g. rainfall, streamflow). Figure 2 demonstrates the various underground water management zones.

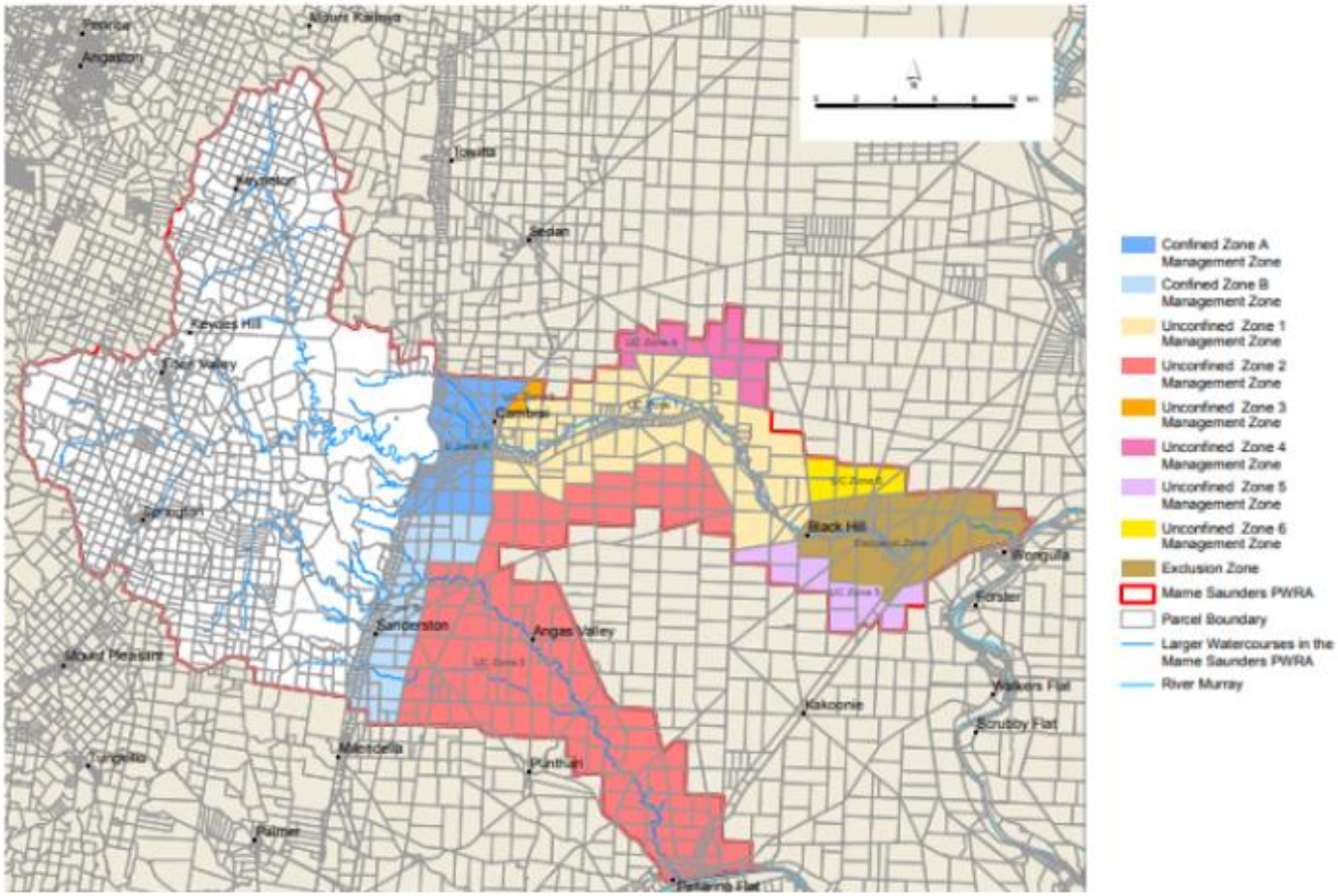


Figure 2: Management zones for aquifers across the Marne Saunders PWRA: Fractured rock zone – solid white; Various Murray group limestone aquifer zones – other colours.

Each management zone has an allocation limit in megalitres (ML), and new allocations must not cause these limits to be exceeded. These limits have been set by considering the available supply of water in different areas and the needs of non-licensed users and the environment. Water allocations cannot be transferred or traded between management zones. Water allocations may be transferred or traded within management zones, subject to WAP rules including more local-scale water use limits.

Does the WAP manage stock and domestic water use?

A water allocation and licence is not needed to take water for stock and domestic purposes in the Marne Saunders PWRA. The WAP does not directly regulate the volume of water taken for stock and domestic use, but the amount of water estimated to be used for these purposes is considered when determining the amount of water available for licensed use under the plan. Building new infrastructure to take water for stock and domestic use (e.g. new or modified dams and wells) will require a water affecting activity permit or a drilling wells permit, which is managed by the Marne Saunders WAP.

For groundwater, estimates have been made of the annual volume of stock and domestic water requirements from each management zone. These volumes have been set aside when setting the allocation limit for each management zone.

A permit is required for drilling a new stock and domestic well. New stock and domestic wells may still be drilled in management zones that are fully allocated for licensed use, subject to WAP rules and approval of the Minister for Climate, Environment and Water.

For surface water, stock and domestic requirements are estimated as 30% of the non-licensed dam capacity in a surface water sub-management zone. This volume is counted against the zone's water use limit when assessing applications to trade allocations between zones.

A permit (or development approval) is required to build, modify or remove a dam in the Marne Saunders PWRA. The dam construction permit rules in the Marne Saunders WAP set out that no new dams can be built in the Marne Saunders PWRA unless certain conditions are met. This applies to stock and domestic dams as well as licensed dams.

Can new dams be built? Can new wells or bores be drilled?

A water affecting activity (WAA) permit (or sometimes a development approval) is required for enlargement or removal of a dam or other water diversion structures. A drilling wells permit is required for the drilling of a new well or plugging, backfilling or sealing of a well. A well permit is also required for repairing, replacing or altering the casing, lining or screening of a well. The Department for Environment and Water assess all well permit applications and can be contacted for further information. A permit is required for all of these activities regardless of whether the water will be used for licensed purposes, or non-licensed purposes such as stock and domestic use.

Under some circumstances a WAA permit may not be required e.g. dam desilting as long as it is carried out in accordance with the WAA Control Policy. Undertaking a water affecting activity without a permit, or in breach of permit conditions is an offence under the *Landscape South Australia Act 2019* and penalties may apply. It is recommended that waer users contact the Water Planning and Assessment Officer in the first instance about any water affecting activity prior to undertaking works.

The rules in the Marne Saunders water allocation plan are used to assess WAA permit applications for these activities (and development applications where relevant). These approvals relate to the

construction or modification of the infrastructure, and don't regulate the volume of water taken from the infrastructure. Permits can include conditions on how the structure is constructed and operated (e.g. including a requirement to pass low flows for new or modified dams and watercourse diversions). Permits can also indirectly affect the amount of water intercepted by a dam by limiting the allowable volume of the dam.

As outlined in information sheet #1 'Water management in the Marne Saunders: history, licences and allocations', water can only be taken from new, modified or existing infrastructure for licensed purposes if the user holds an allocation from the relevant water resource. Taking water for stock and domestic use does not require an allocation and licence in the Marne Saunders PWRA, so the volume taken from new, modified or existing infrastructure for these purposes is not managed under the Marne Saunders WAP.

Is there any more water available for allocation?

There is no more surface water or watercourse water available for allocation in the Marne Saunders PWRA. The only exception is that new roof runoff allocations may be granted in accordance with WAP rules. Roof runoff allocations are only required where more than 1,500 kL is collected and used for licensed purposes. No allocation is required for water collected for stock and domestic use.

There is no more water available for allocation from the confined Murray Group Limestone groundwater in the Marne catchment, the unconfined Murray Group Limestone groundwater in the vicinity of the Marne River, or the Quaternary aquifer that lies above the Murray Group Limestone (i.e. management zones Confined zone A and B, Unconfined zone 1, Exclusion zone and Quaternary aquifer management zone as per Figure 2').

The only way that a user can obtain a water allocation in those resources is by transfer or trade from an existing licence, subject to WAP rules and approval of the Minister for Climate, Environment and Water. Transactions between buyers and sellers of transferred allocations and licences are private arrangements that are not managed by the WAP.

Small amounts of groundwater are available for allocation in other underground water management zones in the Marne Saunders PWRA, subject to WAP rules, approval of the Minister for Climate, Environment and Water, and payment for the allocation. The underground water that is still potentially available for allocation is generally low quality, low yielding, patchy in availability and/or expensive to drill into. These areas have no or limited movement of water to the fully allocated management zones. Taking new water from these areas is not likely to affect water availability in the fully allocated management zones.

Further information

The Marne Saunders WAP, and the Guide to the draft Plan, can be found here:
www.landscape.sa.gov.au/mr/water/water-allocation-plans/marne-saunders

More information

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landscape.sa.gov.au/mr

Marne Saunders water resources

#6 How to address concerns

In 2022, the Murraylands and Riverland Landscape Board (the landscape board) began discussions with the community in the Marne Saunders Prescribed Water Resources Area (PWRA) about the recent series of dry years that have resulted in declining water resources and dependent ecosystems in the catchments.

An information pack has been developed as an outcome of the Cambrai Water Forum in February 2022. A series of 6 papers provides supporting information developed for the upcoming meetings in November 2022:

#1: History, Licences, and Allocations

#2: Hydrological cycle in the PWRA

#3: Water development and use

#4: Resource and ecosystem condition

#5: Frequently asked questions

#6: How to address concerns

The landscape board is initiating a subsequent community engagement process to enable discussion about possible measures to address concerns. The primary cause of these water resource declines – lower rainfall – is not something that can be changed, however actions can be taken to moderate these impacts over the shorter and longer term.

This fact sheet (#6) focuses on possible actions the landscape board could undertake and/or support to address issues related to water resource decline, in addition to ideas that have been raised during community meetings. It is expected that more actions will be identified via the upcoming meetings taking place in November. Once a list of actions has been collated and discussed, these will be assessed using an independently managed risk / benefit approach.

Actions that are already in progress

The Marne Saunders water allocation plan (WAP) and the water licensing system in the Marne Saunders PWRA aim to support sustainable water management in the area by providing rules for sharing water between users, including the environment.

As part of WAP development, the effects of dams and watercourse diversions on environmental water requirements were analysed in the Marne Saunders PWRA. Environmental flow requirements relating to high flows were found to be little affected by dam development. The major impact of dams on environmental water requirements was a reduction in the amount and duration of low to medium flows.

As a result, a priority for the WAP and existing user licensing process was the introduction of the securing low flows policy. This requires that flows that are less than a locally-defined threshold flow rate, are returned or not captured at priority licensed dams and watercourse diversions. This policy aims to address the issue of watercourses drying out which threatens fish populations and other environmental assets in the hills zone. Passing low flows, when they occur, will support critical refuge habitats.

The securing low flows policy started to be implemented on-ground from spring 2017 through the Flows for the Future program. The program has made good progress installing devices to pass low flows but low rainfall has meant that there has been limited opportunity for low flows to be passed.

For more detail regarding the Flows for the Future Program as it relates to the Marne Saunders PWRA, please see section 3.3.6 of the 2009 Marne Saunders WAP Guide to consultation:

https://cdn.environment.sa.gov.au/landscape/images/2009_-Draft-WAP-Guide-for-consultation_complete-website.pdf#asset:41784:url

The WAP and existing user licensing process also introduced a range of other ongoing measures to support sustainable water management, such as:

- Volumetric allocation limits for all local water resources (including reductions in existing user entitlements in areas of high demand)
- An ongoing ban on construction of new dams unless they meet specific criteria
- Exclusion zones around key environmental assets, and
- Local-scale water taking limits and buffer rules to reduce the impact of allocation trade on other users and the environment.

Ideas to address concerns – for community discussion

This section compiles some ideas already suggested as actions that may help to address the impacts of the current decline in water resources on consumptive users and/or dependent ecosystems. Tables 1, 2 and 3 (overleaf) demonstrate a number of actions to start the discussion around addressing this decline. Each table is grouped according to potential measures that *may* be undertaken – outcomes of which may either increase net water availability across the catchment (Table 1); change the way water is allocaed (Table 2); or directly benefit environmental outcomes (Table 3). The landscape board's role in undertaking potential actions is classified as:

- *direct involvement*- through making changes to the existing water allocation plan (WAP) policy
- *indirect involvement*- where the landscape board can facilitate/support measures that could be undertaken by other organisations.

It is important to note that no actions or measures to address declining water resource condition presented here have been decided upon at this stage. The material presented in this document is put forward only to promote discussion among community members and enable the landscape board to gauge the community's thoughts on different actions. Following community discussion, all actions (including those arising from the discussion process) will be independently analysed via a risk/benefit assessment. Community input regarding the potential measures will be integral to that analysis process.

Note: review process for the Marne Saunders water allocation plan (WAP)

The last column of Table 1 refers to the landscape board's direct or indirect role. Some actions have identified the landscape board's role as '*Direct: via WAP provisions amendment following* consultation' meaning changes could occur during a WAP amendment process. The key stages to undertake a WAP amendment are:

- Actions and potential measures are described and developed through community meetings
- These action and measures will be analysed independently via a risk/benefit assessment
- An outcome of the risk/benefit assessment may be a recommendation/option for the landscape board to consider a comprehensive WAP review
- If a WAP review is undertaken (pursuant to section 54 of the *Landscape South Australia Act 2019*), the risk/benefit assessment will be used to inform the community assessment section of the review
- An outcome of the review would likely recommend that amendments be made to the WAP
- A WAP amendment process would require further community engagement and statutory consultation.

The amendment process could include updating current and projected future water availability as well as updates to water-taking limits, including reconsidering the balance between different water needs, better integration of Aboriginal water interests and amending WAP policies.

Amendments to WAP policies need to be within the legislative scope of the plan. This includes the amount of water available for allocation and how this may change over time; how new allocations may be granted; how allocations may be taken, used and transferred; and the rules for assessing applications for specified activities that require approval, including construction and modification of wells and dams, managed (artificial) aquifer recharge, works in and around watercourses, and using effluent and imported water in some circumstances.

The review process could also identify actions that are outside the scope of the WAP.

Table 1: Possible actions to address declining water resource condition which <u>may promote a net increase in consumptive water availability</u> in the Marne Saunders PWRA *(*Note: WAP= water allocation plan; WAA= water affecting activity)*

Action	Potential measure(s)	Landscape board's potential role** ***Direct –** achieved through measures undertaken by landscape board directly (via either existing or new policy); ***Indirect –** supported by landscape board policy relating to the action (measures undertaken externally)
1) Vary total consumptive pool volumes across the catchment	• Adjust total capacity of the resource via WAP, and volume available for consumptive use, to account for climatic changes since WAP adoption. • Vary allocation volumes year to year, to reflect water availability.	• **Direct**: via WAP provisions amendment following consultation
2) Access allocations from water sources within PWRA which are currently restricted	• Support sustainable harvesting of additional runoff from low permeability surfaces (e.g. stormwater, roaded catchments)	• **Direct**: via WAP provisions amendment following consultation *(and);* • **Indirect**: WAP to take on a regulatory role following external agency (e.g. Council) harvesting project implementation *Note: Primary landscape board role- amend WAP provisions to allow additional water to be conditionally allocated from low permeability surfaces.*
3) Get more out of available water	• Improve water use efficiency	• **Direct**: via existing WAP provisions. *Note: The landscape board has a long-standing program to support water use efficiency for irrigators*
	• Accept that less water is available, transition to alternative purposes which use less water	• At landholder's individual discretion

4) Access external or non-prescribed water supplies	• Reuse of local wastewater	• **Direct**: via existing WAP provisions, *(and/or);* • **Direct**: via WAP provisions amendment following consultation, *(and/or);* • **Indirect** (depending on measure): WAP to take on a regulatory role, dependant on scale – e.g. individual businesses, town wastewater *Note: Likely to require approvals from other agencies – e.g. SA Health, EPA. WAA permits also likely required.*
	• Importing water into the Marne Saunders PWRA	• **Direct**: via existing WAP provisions, *(and/or);* • **Direct**: via WAP provisions amendment following consultation, *(and/or);* • **Indirect** (depending on measure): External agencies currently examining this option for Eden Valley. WAP policies may be amended to support this action. *Note: WAA permit required under certain circumstances. If effluent water, similar approvals as above likely required*
5) Improved security of current water resources	• Deepen wells	• **Direct**: via existing WAP provisions. • *Note: At landholder's individual discretion. Requires a DEW Drilling wells permit*
	• Dam maintenance / improvement	• **Direct**: via WAP provisions amendment following consultation, *(and/or);* • **Direct**: via existing WAP provisions. *Note: WAA permit required for most dam improvement measures. Contact WAA officer for information mrlandscape.water@sa.gov.au*
	• Water storage improvements (e.g. tanks, underground)	• **Direct**: via existing WAP provisions. *Note: WAA permit required to recharge aquifer if underground storage is utilised*
	• Alternative groundwater supply	• **Direct**: via existing WAP provisions. *Note: 500 ML available (unused) in Plains zone Renmark group aquifer. May be expensive to drill, supply unknown*

Table 2: Possible actions to address declining water resource condition which may <u>change the way water is allocated</u> in the Marne Saunders PWRA

*(*Note: WAP= water allocation plan; WAA= water affecting activity)*

Action	Potential measure(s)	Landscape board's potential role** ***Direct –** achieved via measures undertaken by landscape board directly (via either existing or new policy); ***Indirect –** supported by landscape board policy relating to the action (measures undertaken externally)
6) Manage unregulated water use	• Explore mechanisms for managing purposes that are currently unregulated, such as stock use, domestic use and commercial forestry	• **Direct**: via WAP provisions amendment following consultation, *(and/or);* • **Indirect** (depending on measure): Could also require WAP to take on a regulatory role following State Government regulation
7) Fully implement / expand passing low flows initiatives	• Explore options to increase or expand participation in low flows program	• **Direct**: via existing WAP provisions, *(and/or);* • **Direct**: via WAP provisions amendment following consultation
	• Adjust method of passing low flows	• **Direct**: via WAP provisions amendment following consultation, if changing environmental water provisions, *(and/or);* • **Indirect**: Low flows program managed by DEW (Flows for the Future). WAP policies may be amended to support this action. *Note: Potentially involves adjusting method to 1) ensure sufficient environmental provision in changing climate; and/or 2) support water security of consumptive users. These two aims may not be compatible.*
8) Reduce dam volumes	• Explore options for reducing dam volumes	• **Direct**: via existing WAP provisions, *(and/or);* • **Direct**: via WAP provisions amendment following consultation, *(and/or);* • **Indirect** (depending on measure): Could also require WAP to take on a regulatory role following State Government regulation *Note: WAP does not have capacity to regulate reduction of dam capacity, except as part of approvals for dam modifications*

Table 3: Possible actions to address declining water resource condition which may directly benefit environmental outcomes in the Marne Saunders PWRA

*(*Note: WAP= water allocationpPlan; WAA= water affecting activity)*

Action	Potential measure(s)	Landscape board's potential role** ***Direct –** achieved through measures undertaken by landscape board directly (via either existing or new policy); ***Indirect –** supported by landscape board policy relating to the action (measures undertaken externally)
9) Direct environmental actions	• Bolstering threatened species populations • (for example establish back up populations in suitable dams or permanent pools; translocate individuals / restock pools once water supply has improved)	• **Direct**: via existing WAP provisions; (*and/or*) • **Indirect**: via collaboration with conservation groups and/or other agencies
	• Direct provision of water to key environmental assets • (for example drip fed water to freshen salty refuge pools, or to prevent pools drying up – from tanks, or suitable groundwater)	• **Direct**: via existing WAP provisions; (*and/or*) • **Direct**: via WAP provisions amendment following consultation *Note: WAA permit likely required to discharge water into watercourse*

As mentioned above, the options listed in Tables 1-3 are intended to promote discussion between the landscape board and community members only. No decision to undertake a WAP review with a view to amending policy has been made. Community opinion derived through upcoming community meetings in November will be factored into a risk/benefit assessment.

Further information sources:

Marne Saunders WAP
The Marne Saunders WAP, and the guide to the draft plan, can be found here
www.landscape.sa.gov.au/mr/water/water-allocation-plans/marne-saunders

Water licensing
For information on water licensing in the Marne Saunders PWRA, please see:
https://www.environment.sa.gov.au/licences-and-permits/water-licence-and-permit-forms/sa-murray-darling-basin

Water affecting activities
For information on water affecting activities in the Marne Saunders PWRA, please see:
https://www.landscape.sa.gov.au/mr/water/managing-water-resources/water-affecting-activities

Flows for the Future
For greater detail on the Flows for the Future Program across the Eastern Mount Lofty Ranges, please see:
https://www.environment.sa.gov.au/topics/water/flows-for-future

Citizen science
A number of opportunities exist for community members to contribute to landscape management by sharing their local knowledge and assisting with water resource monitoring. An outline of these opportunities can be found here:
https://www.landscape.sa.gov.au/mr/get-involved/citizen-science

More information

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www.landscape.sa.gov.au/mr/water/water-allocation-plans/marne-saunders

Marne Saunders Water Forum

Questions & responses

The Marne Saunders Water Forum was held in February 2022, hosted by the Murraylands and Riverland Landscape Board. This factsheet summarises the questions asked at the forum, together with responses.

Background

The Murraylands and Riverland Landscape Board held a water forum on 25 February 2022 in Cambrai, to present information to the community on the current status and trends of groundwater and surface water in the Marne Saunders Prescribed Water Resources Area (PWRA).

This factsheet summarises questions asked about the Marne Saunders water resources at the water forum, together with responses. The responses are a mix of information provided on the day and collated afterwards.

This 'questions and responses' factsheet complements a series of factsheets that summarise some of the key information discussed at the February 2022 water forum, as well as additional background information:

Factsheet 1: History, licences, and allocations

Factsheet 2: Hydrological cycle in the PWRA

Factsheet 3: Water development and use

Factsheet 4: Resource and ecosystem condition

Factsheet 5: Frequently asked questions on the Marne Saunders water allocation plan

Factsheet 6: How to address concerns

These factsheets, and the presentation slides from the February 2022 water forum, are available at the landscape board's website:
www.landscape.sa.gov.au/mr

Water resources

What information is used to understand the behaviour of water resources in the area?

Information on water resource behaviour and status presented at the February 2022 water forum comes from long-term monitoring data on streamflow and salinity, and groundwater level and salinity, collected by the Department for Environment and Water (DEW) and other organisations, and long-term data on climate from the Bureau of Meteorology.

Details of the data and analysis used for the surface water and groundwater resource assessments are available in the annual water resources assessment reports:
www.waterconnect.sa.gov.au/Systems/GSR/Pages/default.aspx

For example, the 2019-20 water resources assessment report is available here:
www.waterconnect.sa.gov.au/Content/Publications/DEW/Marne_Saunders_2021_Technical_Note.pdf

Surface water and groundwater monitoring data can be accessed on the Waterconnect website:
www.waterconnect.sa.gov.au/Water-Resources/SitePages/Home.aspx

Information about how this data has been used to understand water resource behaviour for water planning purposes is outlined in the Marne Saunders water allocation plan (WAP) – particularly sections 2.3 and 4.2. The Marne Saunders WAP is available here:
www.landscape.sa.gov.au/mr/water/water-allocation-plans/marne-saunders

Is water from the Marne valley leaking into the Renmark group aquifer and being lost to the River Murray?

It is not likely that there is water leakage to the Renmark group aquifer, then to the River Murray, for several reasons:

- The Renmark group aquifer is absent for much of the Marne Saunders plains area. This means that there is only a very limited area where such downward leakage to the Renmark group aquifer could occur, and limited connection between 'patches' of the Renmark group aquifer.
- The low permeability Ettrick formation (confining layer) above the Renmark group aquifer means that downward leakage into the Renmark group aquifer is unlikely. The Renmark group aquifer is under pressure, which would also reduce downward leakage into this aquifer.
- The Renmark group aquifer drains towards River Murray as the lowest point in the landscape. The Renmark group aquifer is deeper than the River Murray, but there may be upward leakage from the Renmark group aquifer to the River Murray due to pressure in the confined aquifer. This upwards leakage is likely to be very low, due to the low permeability of confining layer above, and the small volumes would be insignificant.

No streamflow or groundwater information was presented for the Saunders Creek catchment.

The DEW water resources assessment reports include streamflow data for Saunders Creek. The Saunders Creek flow monitoring station started operating in August 2009. The streamflow record is longer for the Marne River, so this data was presented instead to provide a longer-term picture.

There are no DEW groundwater monitoring sites in the Saunders catchment because of the low extraction in the area. Monitoring resources are concentrated in the Marne catchment because the level of groundwater use there is much higher than in the Saunders catchment. Groundwater salinity data from samples provided by licensees in both Marne and Saunders catchments are included in the water resources assessment reports.

The trends in streamflow and groundwater salinity in the Saunders catchment are similar to those presented for the Marne catchment.

For more information, see the summary water resources assessment report reproduced in factsheet 4. More detail, including more data from the Saunders catchment, can be found in the annual water resources assessment reports:
www.waterconnect.sa.gov.au/Systems/GSR/Pages/default.aspx

For example, the 2019-20 water resources assessment report is available here:
www.waterconnect.sa.gov.au/Content/Publications/DEW/Marne_Saunders_2021_Technical_Note.pdf

Water use

Information presented on groundwater use for different purposes doesn't align with attendee's local observations.

The data presented on groundwater use for different purposes was based on metered usage in combination with recent land use data, but the percentages of use for different purposes were an estimate only. These values were presented for information, but have not been refined further as the water allocation plan doesn't regulate how much water gets used for individual licensed purposes (e.g. different crop types). The role of the water allocation plan is to manage the overall amount of water taken within sustainable limits, regardless of specific use purpose.

How many dams have been built since 1999?

Dam capacity has not increased significantly since 1999 when the Notice of Restriction (moratorium on further development) was placed in the area. The landscape board is not aware of any approved increase in dam capacity since the requirement for a dam construction permit was introduced in 2003.

How much water is captured in dams?

Factsheet 3 'Water development and use' provides information on the number and volumes of dams, and the volumes taken from them, for the Marne Saunders PWRA. That factsheet also provides similar information for groundwater resource development and use.

Surface water models have been used to estimate what the flow would have been without dams and watercourse diversions, compared to modelled flow under current conditions. The graph below (from the Marne Saunders WAP) shows annual modelled flow for 1974-2003 for the Upper Marne from the modelled no dams and current dams scenarios (pink and blue columns), as well as the percentage reduction of annual flow from the no dams scenario to the current dams scenario for each year (black line). It can be seen that the percentage impact of dams is highest in dry years, and lower in wet years.

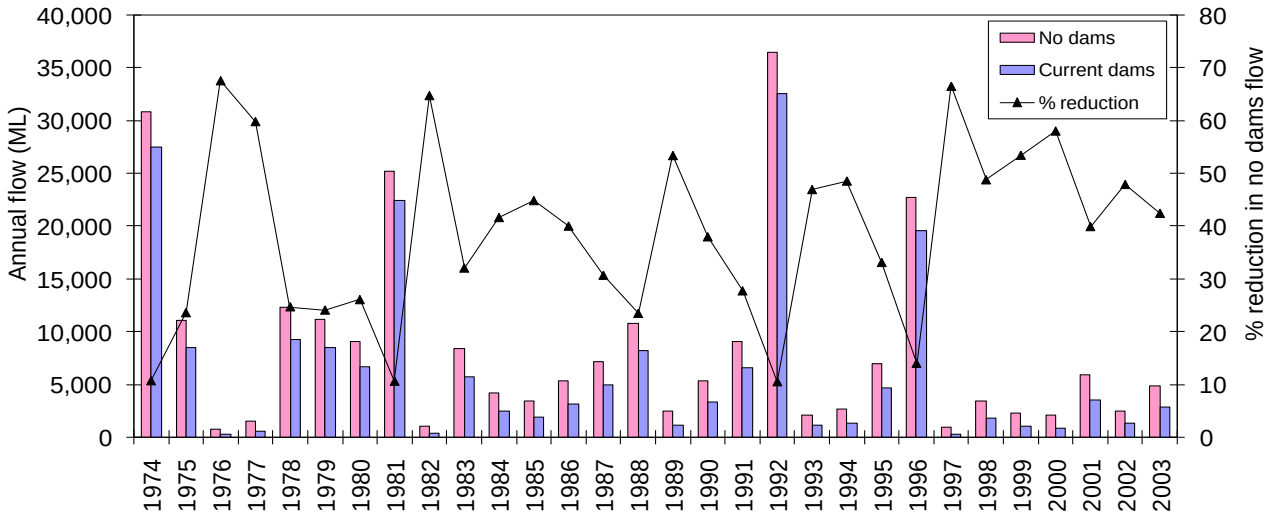

Figure 20 from the Marne Saunders WAP

Modelled annual flow for 1974-2003 for the Upper Marne under the no dams and current dams scenarios, showing percentage reduction from no dams annual flow to annual current dams flow.

Status of water resources and dependent ecosystems

Water capture and use affects water availability, not just climate.

Yes, both climate and water use are important.

Water resource development expanded strongly in the Marne Saunders PWRA in the years leading up to 1999, when moratoriums on further development and then the Marne Saunders WAP placed a cap on further development of the most impacted water resources. At the same time, there has been a long-term trend of declining rainfall, with a series of below average rainfall years from 2017 having particular impact on water availability.

Are fish declining because of a lack of running water?

Fish can survive in pools with no riffles (short areas of broken, running flow). However, a lack of flow is a big issue for long-term health of fish populations as flow is important to support breeding, growth to adulthood, migration and recolonisation. The trend of fish decline in the Marne Saunders PWRA discussed at the water forum is happening in many places across the state.

Are platypus still in the Marne River – thought they had been seen/recorded only 15 years ago?

Presenters at the February 2022 water forum are unaware of platypus sightings in the Marne or Saunders catchments.

There have been no confirmed records since the 1970s on mainland South Australia, so platypuses have been considered extinct from the wild on mainland South Australia. There have been some recent sightings (unconfirmed) in Sturt Gorge (2017) and the Riverland (2018), as per data available in NatureMaps:
https://data.environment.sa.gov.au/NatureMaps/Pages/default.aspx

Actions and how to address concerns

Does the Flows for the Future program install weir systems in the river that help to saturate the river and plains, sometimes called 'leaky weirs'?

The scope of the Flows for the Future program does not include installation of 'leaky weirs'. Primarily, the program works with landholders in the Eastern Mount Lofty Ranges and Marne Saunders PWRAs to restore more natural flows in the catchments, by installing low flow devices on dams and watercourse diversions to allow the passing of a portion of flows as they naturally occur.

Is the amount of flow being passed by low flow devices monitored?

The Flows for the Future program do not monitor the amount of flow passed on all devices installed. However, a number of monitoring sites have been established along the Marne River and Saunders Creek and are used to measure the outcomes of improved flow. Ecological monitoring also takes place through the landscape board's fish monitoring program, and community programs such as the Marne Saunders Bioblitz.

Are there alternative water supplies that can be used in the Marne Saunders, such as treated wastewater from Bolivar? Can environmental flow be provided by discharging River Murray water down the Marne?

Alternative water sources could be considered for consumptive use and/or environmental provisions. Environmental water provisions could occur as direct watering, and/or by increasing availability of local water resources to the environment if some consumptive needs can be provided through alternative sources.

Alternative water sources could include external water brought into the area, as well as alternative local sources such as local wastewater and stormwater. Stormwater is part of the prescribed surface water resource, so using it for licensed purposes is regulated through the water licensing system and water allocation plan.

There is already some use of alternative water sources in the area, such as delivery of 'off-peak' River Murray allocations through the mains, and re-use of treated local wastewater.

Continued development of alternative water sources would require significant ongoing resources and time for planning and implementation, as well as sustainable availability of suitable alternative water sources.

There are a wide range of considerations required – some of them include:

- sustainability of taking water from different alternative water sources (e.g. River Murray is already over-allocated, so it is not sustainable to take more water from there to address issues in the Marne Saunders PWRA)
- the need to consider the manner of environmental provisions (e.g. timing, water quality, and transmission losses – direct watering may be more beneficial for emergency actions).

Would discharging River Murray water into the Marne to provide environmental water kill the native fish?

This is unlikely. Native fish can adjust to other waterways. For example, fish have been translocated to dams in the Eastern Mount Lofty Ranges as an emergency measure or to establish backup populations.

Are there other options for fish breeding or stocking to keep native fish in the Marne Saunders system?

Yes, this may be an option. These actions would require funding, and don't address the current issue of reduced flow conditions.

More information

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https://www.landscape.sa.gov.au/mr/water/water-allocation-plans/marne-saunders

Version 1