



# Warren–Donnelly

surface water allocation plan:

2023 evaluation statement and future planning

The Warren-Donnelly area is a unique and special place, with striking natural landscapes and high conservation values (Figure 1). The Noongar people are the Traditional Owners of the area, with continual living cultural and spiritual connection to the land. The Warren-Donnelly area is also one of Australia's premier agricultural regions that supports diverse businesses and communities. The region's pristine environment and food production attracts thousands of tourists every year.

This region, along with all of south-west Western Australia, is facing the challenges of climate change, with a marked drying trend in rainfall since 1970. Climate projections over this area indicate rainfall will continue to decline into the future. This presents both a challenge and an opportunity for water users to explore water security and resilience.

## Acknowledgement of Country

The Department of Water and Environmental Regulation acknowledges the Traditional Owners and custodians of the Warren-Donnelly area, the Noongar people, and their deep and continuing connection to the land and waters of the region.

We pay our respects to Elders past, present and emerging, and to all members of the Aboriginal communities in the Warren-Donnelly area and their cultures. We acknowledge that Traditional Owners have been custodians of Country for countless generations and that water is integral to life.

We recognise that Aboriginal people and their culture across the Warren-Donnelly area are diverse and that continued custodianship of the land and water is fundamental to their health, spirit, culture and community.

We embrace the spirit of reconciliation, and we seek to listen, learn, and build strong partnerships with genuine opportunities for Aboriginal people throughout our business.

There is a long history of water management in this area, following proclamation of the Warren River catchment in 1959 and the Donnelly River catchment in 1968. In 1963, a local water users' group, the Warren Donnelly Water Advisory Committee, was established. Water licensing was also introduced at the request of landowners and the community, to assist with the equitable management of these local water resources.

In 2012 the Department of Water, a predecessor to the Department of Water and Environmental Regulation (the department), released the [Warren-Donnelly surface water allocation plan](#) (the plan). The plan was developed in consultation with the Warren Donnelly Water Advisory Committee, the horticultural industry, licensees, and the community. The plan set water resource objectives, water allocation limits and licensing policies to manage water resources for desired plan outcomes and objectives.

In 2016, the [first plan evaluation statement](#) was publishing showing the allocation limits and licensing policies were continuing to provide a useful framework for managing the surface water resources. The department then released the [Donnelly River allocation statement](#) in 2018, after assessing Donnelly River allocation limits and water availability for an irrigation scheme, while continuing to maintain water for environmental flows and existing self-supply water use.

This is the second plan evaluation statement, and it also outlines work completed and proposed for water management in the future. In this evaluation, we considered how well management under the plan has performed against the water resource objectives since the plan's release in 2012. Our evaluation found that the plan's water resource objectives are generally being met; although, under a warmer and drier climate in the future, these objectives may not be achievable.

The department will now begin developing a new Warren-Donnelly surface water allocation plan to address the challenges of climate change. The new water allocation plan will be informed by contemporary science, including recent streamflow monitoring and the Bureau of Meteorology's latest climate change projections. The new water allocation plan will also be developed in consultation with key stakeholder groups, including Traditional Owners, the horticultural industry, licensees, environmental groups, recreational groups, the local community and other government agencies.

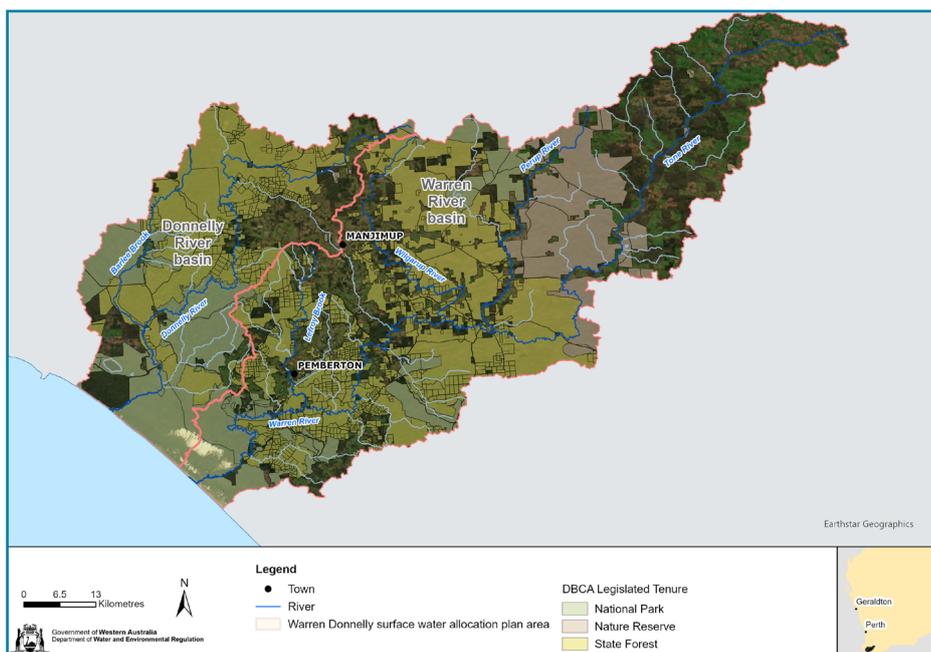


Figure 1 Warren-Donnelly area

# Status of the water resources

The south-west of Western Australia has experienced declining rainfall since 1970, particularly in autumn and early winter (DWER 2021). Rainfall decline in this region has been larger than anywhere else in Australia (DWER 2021). Also, mean temperatures have increased by about 1.1°C since 1910, with the rate of warming higher since 1960 (DWER 2021). In the Warren-Donnelly area, average annual streamflow has been about 30–70 per cent lower over the past two decades compared with streamflow in the 1980s and 1990s.

In response, the department set allocation limits in the plan to provide reliable water in all but the driest years. The allocation limits are based on a benchmark dry year for each subarea (the year of lowest streamflow for the period 1975–2007, generally 1987) (DoW 2012). The allocation limit includes an amount available for licensing and an amount for water uses that do not require a licence (referred to as exempt use). In some subareas, the allocation limit also includes an amount reserved for public water supply (see Water for public water supply section).

Currently, 15 out of the 25 subareas have no water available for further licensing (Figure 2). Most water licences are for the capture of water in on-stream dams during the wetter months for irrigating crops over the drier months.

Looking ahead, future climate projections indicate that low-runoff and drought conditions will occur more frequently (Turner et al. 2022). Under these conditions, the irrigation requirements of existing crops will increase while surface water availability reduces. This can be mitigated by, for example, using water more efficiently and adapting the types of produce grown to drier conditions.

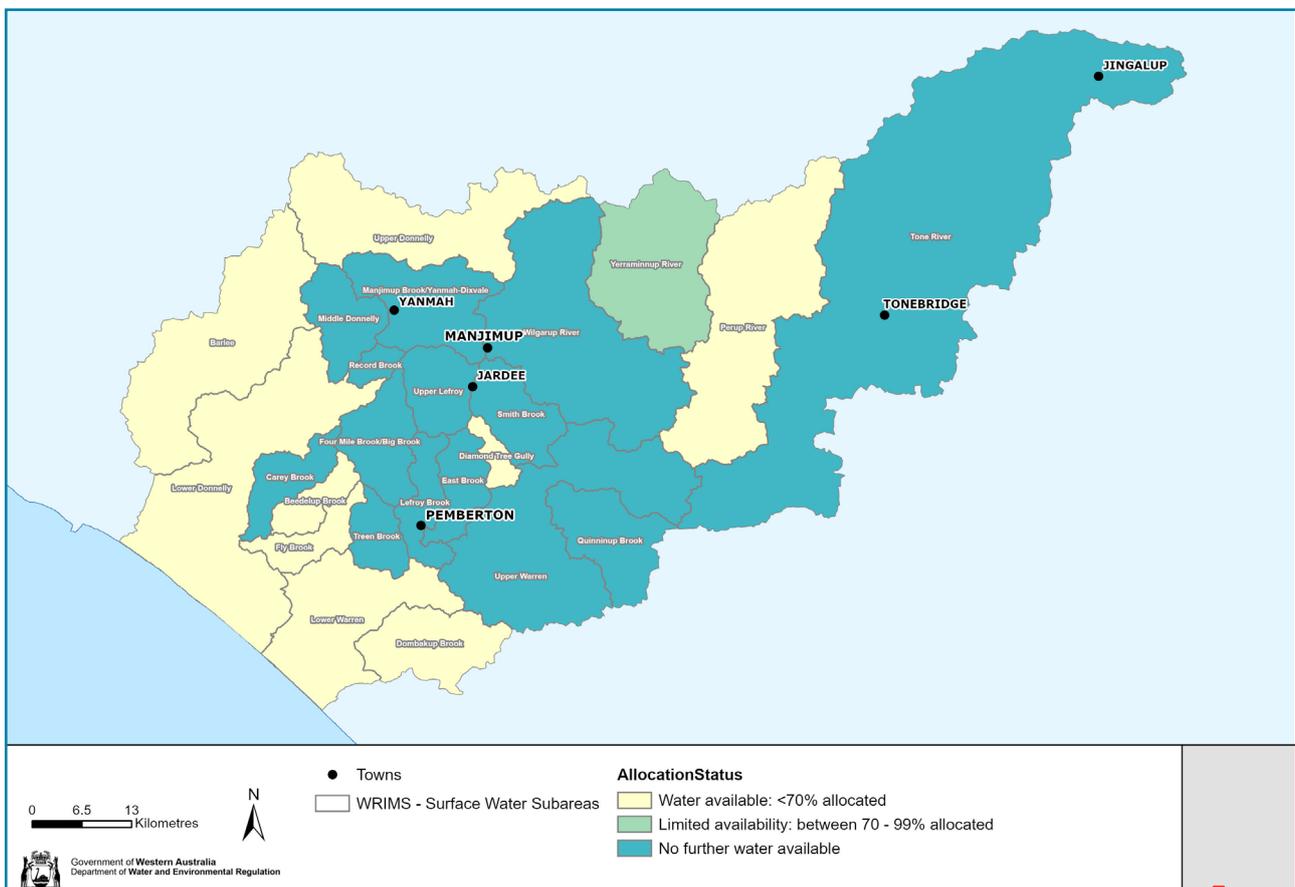


Figure 2 Allocation status across the Warren-Donnelly area shows that most subareas have no further water available for licensing, as of 31 December 2022

# Evaluation of water resource objectives

The department evaluates water allocation plans to identify what we have successfully implemented and where improvements are needed. In evaluating the plan, we considered recent information on rainfall, streamflow, allocation status and environmental values to inform whether the water resources objectives are being met.

Generally, we are meeting the plan's water resource objectives. The following information and sections support these findings.

Status of and evaluation against the water resource objectives
<p><b>Objective a)</b> <i>Flow regimes in irrigated subareas that supply licence entitlements in almost all years. This includes leaving sufficient water in rivers to reach downstream users and to meet minimal environmental needs in dry years.</i></p>
<p><b>Status: Met</b></p> <p>Generally, water entitlements are equal to dam capacity. Water level monitoring and satellite imagery show that, generally, dams consistently reached maximum storage levels in recent years. This indicates there was sufficient flow to refill what was depleted from the dams each year and, therefore, supply water entitlements in almost all years. Further detail in <i>Water for irrigated agriculture</i> section.</p> <p>Of note, streamflow monitoring recorded some annual flows lower than the low-flow year used to set allocation limits in the plan. In dry years, farm dams intercept a larger proportion of the total annual flow, leaving less water in the river for the environment. As the volume and frequency of low flow years increases with climate change, understanding how the seasonality and pattern of the flow regime is changing (along with continued ecological monitoring) will be important to understand whether flow regimes are continuing to meet environmental needs in dry years. Further detail is in the <i>Water for the environment</i> section.</p>
<p><b>Objective b)</b> <i>Flow regimes in forested and conservation subareas that maintain existing environmental and social values. This includes retaining most or all of the water as environmental flow where land-use zoning is not compatible with irrigation.</i></p>
<p><b>Status: Requires further monitoring</b></p> <p>Long-term streamflow monitoring indicates that flow regimes have changed with reduced rainfall. On-going river health assessments indicate a slight decline in the condition of river ecology; however, we need further monitoring of river ecology over a longer period to further assess this objective. Further detail is in the <i>Water for the environment</i> section.</p>
<p><b>Objective c)</b> <i>Sufficient flow retained for the existing public water supply reserves.</i></p>
<p><b>Status: Met</b></p> <p>Surface water and storages continue to provide water for public water supply for the towns of Manjimup and Pemberton. The reliability of water supply for the town of Manjimup has increased with supplementation from groundwater. We are working with the Water Corporation on its source development plans and investigations for the Pemberton and Warren-Blackwood Regional Water Supply Scheme. This will determine if or how surface water take will be considered as part of meeting future demand. Further detail is in the <i>Water for the public water supply</i> section.</p>

## Status of and evaluation against the water resource objectives

### Objective d)

*Sufficient freshwater flows in the Warren River to complement the salinity recovery targets.*

#### **Status: Not met**

Salinity along the Warren River at Bullilup and Wheatley Farm gauging stations indicate that average annual salinity has remained steady or has slightly increased since 1999. The department continues to meet its salinity management obligations through the *Country Areas Water Supply Act 1947* (CAWS Act). Observations suggest a salinity recovery target of 500 mg/L by 2030 is uncertain. Further detail is in the *Water for salinity recovery* section.

## Outlook for water resource objectives over the next 10-15 years

Depending on the rate and magnitude of climate change and changes in water and land use, the water resource objectives for irrigated agriculture, the environment, public water supply and salinity recovery may not be achievable over the next 10–15 years.

In the future, under warmer and drier conditions, lower streamflow may see irrigators holding less water in storage between years for reasons such as higher evaporation losses or increased water demand. Under these conditions, there is also a risk that dams may not fill to their full capacity depending on the size, location, number of upstream dams, the portion of residual water from the previous year, and how the dam is managed.

On-stream dams generally capture all upstream flow until the capacity is reached. In low flow years, this method of take disproportionately impacts the environment as most flows are captured in storage before spilling occurs, delaying water for the environment and other downstream users. As a result, under climate change we expect the existing ecology to change, or be restricted in distribution, as flows and access to habitat reduces.

While the environment adapts to climate change, it is important that all water users consider how to equitably share in adapting to streamflow changes under a drying climate.

Given the clear science of a drying climate, future changes in water availability may affect the balance between environmental and consumptive water uses. This means the current water resource objectives may not be suitable for the contemporary needs of the community. As part of developing the next water allocation plan, we will include a review of the current water resource objectives and monitoring requirements.

# Water for irrigated agriculture

The plan aimed to manage water entitlements so that on-stream dams can reliably capture water to support the existing irrigated agriculture industry (Figure 3).

On-ground observations and aerial and satellite imagery showed that most dams in the region have reached a similar maximum storage level over the past few years. This indicates there is sufficient water to refill the volume of water abstracted and lost from storages each year. However, this is a general observation and some variation in the performance of individual dams is expected, depending on size, location, number of upstream dams, the portion of residual water from the previous year, and how the dam is managed.



Figure 3 Aerial photo of irrigated agricultural land and on-stream storages in the Warren-Donnelly area

These observations are also supported by storage monitoring in a small number of dams, which show that these dams reached full capacity in a recent low-flow year (2019). The monitoring shows that licensees often decide to leave some of their water entitlement in storage to address losses, dam health or drought proof their use. This means that water from the previous take period may be present in these dams at the end of the irrigation season. It also means that, although storage in most dams reached full capacity each year, we have not seen the effect of water users abstracting their full entitlements and whether dams would fill as often with increased abstraction.

The plan set allocation limits based on a benchmark low-flow year to ensure the flow regime would meet both irrigation and environmental needs in most years. Streamflow monitoring indicates annual flows lower than the benchmark year have occurred (2010, 2012, 2015 and 2019). As the frequency of years with flow lower than the benchmark year increases, there is an increasing risk that licensees may not be able to access their full entitlement as often, and that the flow left in the river is not sufficient for a healthy ecosystem. Therefore, it is not clear if the long-term reliability of licences will be maintained over the next 10–15 years. This will depend on the rate and magnitude of rainfall and streamflow change, and if there are changes in the amount of water abstracted from storages for crop requirements.

As part of considering reliability of supply for new licence applications and water trades, the department will assess contemporary streamflow records. In instances where water entitlements are returned to the department, this water may not be reallocated where the reliability of supply is likely to be low or may reduce the reliability of supply to existing downstream users or the environment.

## Completed and on-going activities

Detailed below are several water licencing, monitoring and research activities completed or underway to progress water for irrigated agriculture.

### **Compliance and enforcement**

The department undertakes compliance and enforcement activities in response to our own audits, monitoring and to complaints we receive. Our response to unauthorised dam construction, unauthorised take of water or other non-compliance is guided by the department's [Compliance and Enforcement Policy](#).

Our compliance program includes a metering audit and meter checks to ensure metering of direct pumping, take from storages accessed by multiple users, or where dam capacities exceed the licensed annual water entitlements is accurate.

The department considers that most licensees are generally compliant based on compliance reporting. However, in response to a high proportion of fully allocated resources and declining streamflow, the department is targeting incidences where dams have been constructed or amended without authorisation to support supply for existing users of the resource.

### **Auditing and accounting of farm dams**

In 2022, the department remapped farm dams in the plan area using aerial and satellite imagery. We are in the process of verifying licensed water entitlements against storage capacity information for each dam, such as post-construction surveys and dam design documentation.

We identified that the level of exempt use is higher than when the plan was released. Exempt water users generally have small water needs. Accounting for these users in the next water allocation plan is important to make sure we consider their water security under a drying climate.

We are also exploring methods to determine the volume of water extracted from on-stream storages each year (as a proportion of storage capacity) which has previously been estimated at 30-50 per cent of the total capacity. Additional on-farm water information and metering would be beneficial to refine the accuracy of our accounting of water in the landscape.

## **Renewing water licences**

Currently licences are renewed for up to 10 years, which is consistent with statewide policy ([Section 5C licence tenure](#)) and applicable to all industries. Licence holders are responsible for applying to renew their licence applications before the expiration date stated on their licence. Upon renewal, the department may review the licence and consider amendments to the licence to reflect contemporary circumstances, including adding, changing or removing terms and conditions.

## **Conditions on licences**

Conditions are placed on water licences to regulate the impacts of take on the water resource. In setting conditions, we consider whether the proposed taking and use of water is environmentally acceptable or if the take of water would have a detrimental effect on another person. As stated above, conditions may change when licences are renewed. Conditions on individual licences are confidential; however, the department can provide some general information on the type of conditions that are used in the plan area. For example, a winter-take period and bypassing flow below a specified flow rate.

### ***Winter-take period***

In line with the plan's local licensing policy, the department has placed a winter-take period condition on licences in the Warren-Donnelly area (on new and renewed or amended licences, since 2016) which states that the licensee shall only take water from the watercourse to fill a dam during a winter-take period. This ensures that flow outside of the winter-take period, which is generally low, is left in the river to support exempt water users and environmental needs.

Streamflow monitoring across the Warren-Donnelly area shows that, in general, about 90 per cent of annual flow occurs from 15 June to 15 October each year. This date range has been used to define the winter-take period so that licence holders can capture water when the bulk of the annual flow volume occurs and to minimise downstream environmental impacts. Without specifying a period of take for licensees, on-stream farm dams could intercept all runoff outside this period until storages fill.

Early season flows are very important freshening flows for downstream ecosystems, which provides relief to aquatic species following the dry season. These flows also provide a signal for the coming wet season, where species will prepare for upstream migration to reach suitable breeding areas. Declining flows, late in the flow season, provide a signal and an appropriate water depth for species to move downstream to permanent refuge areas – these are the last flows that important habitats receive before the dry season starts. Without these late flows, aquatic species will experience harsher environmental conditions over the dry season and may become stranded in unsuitable areas.

As seasonal flow patterns change broadly with climate, the department will adjust the winter-take period to cover the period in which most flow occurs and to make sure the early and late-season flows are protected for river and ecology health.

### ***Bypassing a specified flow rate***

In line with the plan's local licensing policy, the department may require licensees to bypass inflows below a threshold flow rate, either around or through the dam (or diversion point), throughout the year. Only flow above the threshold rate may be captured.

The bypass condition has been used on both variable take and general water licences. This condition serves to:

- prevent unacceptable change to the reliability of supply for existing downstream water users
- maintain flow downstream of dams for the environment.

As the climate continues to dry, and dams are likely to spill less frequently, bypasses will become even more important to share reduced water availability between water users and the environment. Therefore, we will use a contemporary streamflow record to determine bypass requirements.

### ***Fish passage***

In line with the plan's local licensing policy, the department can require that on-stream dams include structures that allow the migration of aquatic species to occur as a condition of a licence. These structures, in combination with bypassing flows, keep migration pathways open and allow native species to access upstream habitats or breeding areas.

### **Facilitating trades and agreements**

Landowners and the occupiers of land can access water or additional supplies through trades or agreements with other licence holders. Since 2017, the department has registered 14 trades or agreements in the plan area. All trades and agreements should be approved by the department to ensure that any potential impacts to third-party activities are considered.

### **Spring exemption guideline**

The department published the [Guideline: Spring exemptions](#) (the guideline) on 20 April 2023, following an extensive public consultation and review process. The purpose of the guideline is to clarify interpretation of section 5(1)(a) of the *Rights in Water and Irrigation Act 1914* (the RIWI Act). There is no change to existing legislation on the spring exemption.

The guideline establishes a voluntary self-assessment process to assess whether section 5(1)(a) applies to a spring on a property. It outlines the relevant considerations that need to be considered by landowners and occupiers of land when determining if the circumstances on their property meet the requirements of section 5(1)(a).

Community feedback and field testing, over the five-month public comment period on the draft guideline, helped shape the final version of the guideline. A consultation summary report is available online, capturing the main feedback themes over the five-month public consultation period and the department's response. A field guide has also been published, which can be used by landowners and occupiers of land once they have read and are familiar with the definitions and guidance provided through the guideline.

Assessing whether a section 5(1)(a) spring exemption applies to individual hydrological and development circumstances on a property can be complex. Landholders or occupiers of land are encouraged to work through the step-by-step self-assessment process in the guideline and field guide, to ensure the sometimes complex hydrological and legal considerations of section 5(1)(a) are met, and dams are constructed lawfully. The guideline, field guide and consultation summary report can be found at the [Water resources webpage](#).

### **Variable take licensing**

The Warren-Donnelly area is the only area in Western Australia that has two-tier water licensing (high and low-reliability entitlements) for self-supply, on-stream storages. Originally, the department assumed there would be low demand for variable take water licences given its low reliability. However, interest in variable take water licences was higher than expected, resulting in 10 gigalitres of low-reliability water being licensed between 2015 and 2017. In 2017, we set allocation limits for variable take licensing to manage potential risks of further licensing to the reliability of supply to existing users and environmental requirements.

Setting allocation limits for variable take licensing was also made in response to concerns about:

- the ability to regulate, and for dam operators to comply with, varying the capture of water from on-stream storage between years
- whether bypass infrastructure was passing the required flow rates
- climate change reducing the reliability of variable take water licences and potentially leading to a legacy of unused in-stream infrastructure
- the difficulty in forecasting a variable take year in advance
- the amount of additional resourcing needed to undertake effective compliance with increasing complexity of licensing rules for when water can and cannot be captured
- impacts on the timing and volume of flow to the environment and exempt users.

The department has undertaken site inspections or monitoring on most variable take water licences. We found that some infrastructure had not been developed or that the take and use of water was not happening. The assessment of unused water is managed under the department's [Management of unused water licence entitlements policy](#). Any variable take water licence returned to the department will not be made available for reallocation.

### **Engaging expert advice on water carryover**

The plan states the department will generally set the water entitlement as the dam capacity. This allows for a largely self-regulating system where take cannot exceed the annual water entitlement because the infrastructure in place does not allow for this to occur, particularly where the take (capture of water in a dam) and use of water (irrigating crops) occur in different seasons.

Water carryover refers to the ability to hold water in on-stream storages from one year to the next, while not limiting the ability of the licensee to capture their full water entitlement the following year. Water carryover can currently take place by moving water to off-stream storages or low-reliability, variable take storage capacity.

We have engaged an independent consultant to develop a discussion paper on water carryover for on-stream farm dams, with input from the Warren Donnelly Water Advisory Committee.

We anticipate carryover may require costs to licensees for infrastructure changes, measurement, monitoring and reporting, and require increased resourcing for the department to ensure compliance. The potential for carryover will be considered in the next water allocation plan.

### **Manjimup Brook gauging station**

Streamflow monitoring is critical for evaluating the performance of water management. Our streamflow data and information about our measurement and monitoring is available on our [Water information reporting webpage](#).

In May 2021, the department upgraded a short-term monitoring site on Manjimup Brook at the Gregory Road Bridge (Figure 4) to a permanent gauging station. This station measures runoff from important agricultural land and some state forest in the Manjimup Brook/Yanmah-Dixvale subarea. The gauging station was designed to ensure accurate streamflow measurements across a range of flow rates while also considering fish passage requirements.

The department engaged closely with the South-West Aboriginal Land and Sea Council while constructing the new Manjimup Brook gauging station. This included heritage surveys to ensure cultural sites and values were considered during construction.



Figure 4 New gauging station infrastructure on Manjimup Brook is allowing us to permanently measure streamflow while better enabling fish passage.

## Viability of a large-scale irrigation scheme

The plan acknowledges the possibility for a large, centralised irrigation scheme. This concept was explored as part of the previous state government's Water for Food program and then developed into the proposed Southern Forests Irrigation Scheme, which contemplated the construction of a new dam on Record Brook.

On 7 October 2022, the State Government announced it was not proceeding with the Southern Forests Irrigation Scheme in its current form, as the climate modelling indicated that the dam on Record Brook was not viable. This decision was informed by an assessment of the proposed Southern Forests Irrigation Scheme in 2022, using future climate projections from the Bureau of Meteorology. The findings are available on the Department of Primary Industry and Regional Development's [Water Security for Southern Forests Horticulture Industry](#) webpage. Based on this information the department has removed the reserve created in the *2018 Donnelly River Allocation Statement* for the proposed scheme. The department will retain the allocation limits for the Middle and Upper Donnelly set in the *2018 Donnelly River Allocation Statement* until they are reviewed in line with the next water allocation plan.

## Collaborating on new climate change projections

Global climate models have been developed by many organisations around the world and represent our understanding of what drives climate change, how and why it changed in the past, and what the climate may look like in the future by investigating how the global climate will respond to greenhouse gas concentrations (BoM 2022). The Bureau of Meteorology has developed [future climate projections](#) based on global climate models from the Intergovernmental Panel on Climate Change, Coupled Model Intercomparison Project 5 (CMIP5). We are collaborating with the Bureau of Meteorology to update our water-related guidance on using future climate projections to assess risks from climate change to water resource decision-making.

These recent climate projections for the Warren-Donnelly area show that:

- rainfall and water availability are very likely to continue decreasing
- the magnitude of change is expected to be within a certain range, with a greater change projected under a future without effective climate change mitigation (a high greenhouse gas concentration pathway – Figure 5).

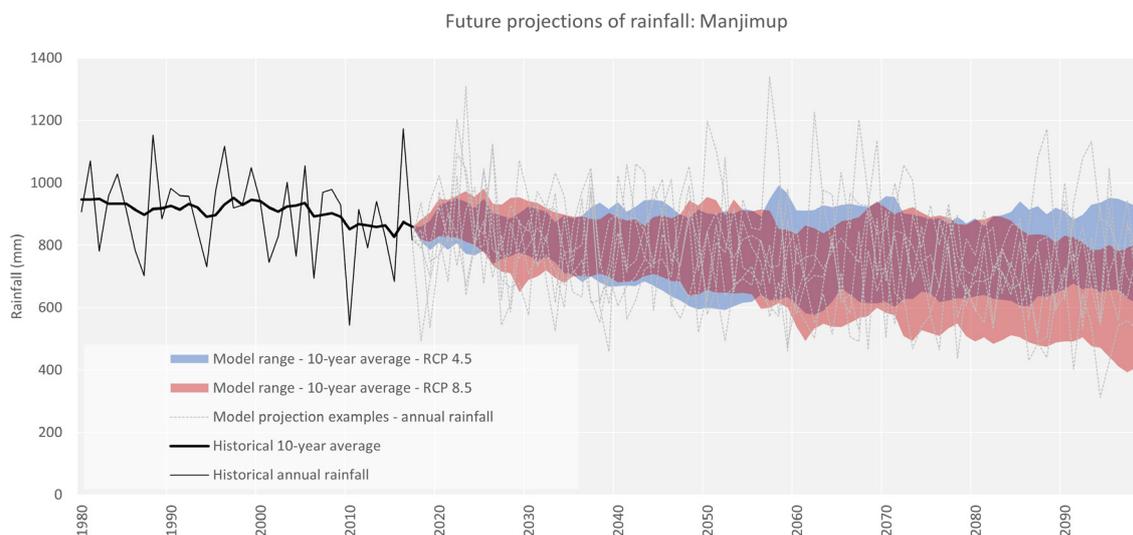


Figure 5 The observed decline in annual rainfall is projected to continue in the Manjimup subarea, with varied magnitudes of change (in the 10-year average, shaded area) and more decline under a high greenhouse gas scenario (red shaded area)

## **Working with researchers to understand water use and efficiency**

We are collaborating with research organisations on water use, crop water requirements and water efficiency measures to guide water security under climate change. An example of this is the [Food Agility Cooperative Research Centre On-Farm Water Demand](#) project.

In addition to climate change, water needs and water availability are influenced by changes in water use practises. Improvements in water efficiency (such as using soil moisture monitoring), water trading and evolving crop types, can assist licensees to increase water security in a drying climate.

## **Ecological values of farm dams**

On-stream agricultural dams built for storing water for irrigation may also be providing habitat to aquatic species over the dry season. In May and June of 2022, the department funded Murdoch University's Centre for Sustainable Ecosystems – Harry Butler Institute research to look at the presence of freshwater fish, crayfish, mussels, and water quality in 20 farm dams in the Boodjidup Brook catchment near Margaret River. The study found most of the dams are providing a dry season refuge for western minnow, with one dam also supporting nightfish. The researchers suggested dam connectivity with the downstream watercourse (e.g. through a low-gradient overflow spillway) influenced the presence of these species in the dams. Dam connectivity with the upstream watercourse (e.g. through the presence of a defined streamline upstream of the dam) influenced the abundance of species, likely because the streamline provides a more suitable breeding habitat than the dam.

Members of the Warren Donnelly Water Advisory Committee and other stakeholders have expressed interest in a similar study in the Warren-Donnelly area. The department is continuing to talk to stakeholders and investigate avenues for research funding.

# Water for the environment

As well as a centre for agricultural production, the Warren-Donnelly area is host to an array of highly valuable sites of ecological, cultural and social importance that depend on surface water. The area has one of the highest diversities of freshwater fish and crayfish in south-west Western Australia. The plan supports water for irrigated agriculture while ensuring enough water remains in the surface water system to support the environmental values (ecological, social and cultural) of these waterways.

Environmental flows (also known as ecological water requirements) are the minimum flow requirements needed to maintain a river's ecological values at a low level of risk. Environmental flows recognise the importance of the natural pattern and variability of flow, both within and across years, in maintaining a healthy and adaptive river ecosystem. Environmental flows also help maintain the water-dependent social and cultural values of rivers. For example, the flows needed for a healthy ecosystem will meet the social value needs of a scenic view along a walk trail by providing an appropriate water level, visibly flowing water, and healthy bankside vegetation. Similarly, the continued spiritual connection of waterways in the south-west with the Noongar people is linked to the health of waterways, which is a key consideration of environmental flows (Goode et al. 2007, Arthington et al. 2018).

In determining environmental flows, we use topographic surveys of river channels to link key ecological features and functions to measured water levels and flow rates. This provides site-specific flow requirements to achieve important ecological functions both laterally (across a river channel) and longitudinally (along a river, upstream and downstream) within a river. Figure 6 provides a graphical representation of how different flow volumes achieve different ecological functions within a river channel.

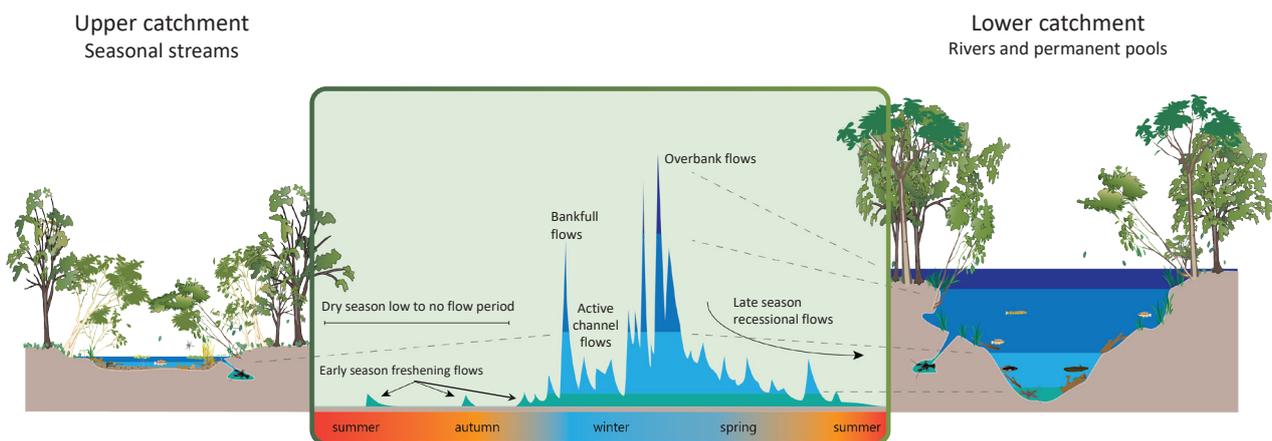


Figure 6 This representative hydrograph of a south-west flow regime shows some of the different ecologically important flow components that can occur within a year, and some of the important ecological functions they achieve within a river channel. For an interactive version of this figure and descriptions of the different flow components and their ecological functions, visit our [Ecological water requirements webpage](#).

The department has one published environmental flow study in the Warren-Donnelly area, on the Lefroy Brook, downstream of the Cascades gauging station (Donohue et al. 2009). At this site, looking at the total number of days ecologically important flow events occurred, we compared the 1987 modelled environmental flow (the plan’s benchmark low-flow year for this site) with the recent low flow years of 2010, 2012, 2015 and 2019. These ecologically important flow events occurred for a similar number of days in recent low years for most ecological functions (Figure 7). Flows that provide for pool water quality, fish passage and summer macroinvertebrate habitat occurred less often in the 2010 and 2012 low flow years compared with the 1987 modelled environmental flow.

On average, the number of days a year these ecologically important flow events occurred has reduced, when comparing data before and after the plan release (Figure 7). While averages do not recognise the importance of the timing and duration of individual events in maintaining river ecosystems, the declines across the full range of flows do signal the longer-term reduction in water availability under climate change.

As part of developing the next water allocation plan, we will assess the risk to ecological values of continued reductions in the duration and timing of ecologically important flow events, to inform the future management direction.

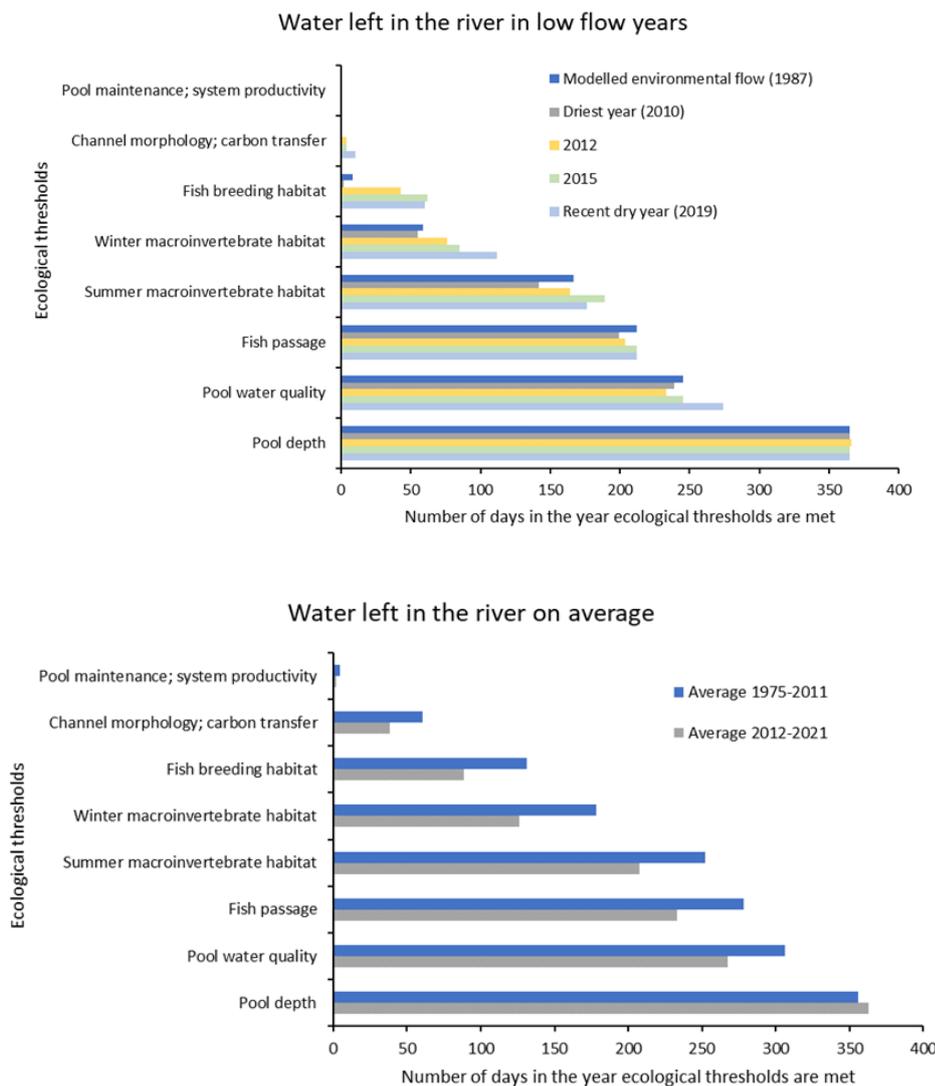


Figure 7 The number of days ecological thresholds were met in Lefroy Brook in dry years (top) and on average before and after the plan (bottom)

## Completed and on-going activities

Several research and monitoring activities are underway to support water for the environment.

### Healthy Rivers South-West

The department's [Healthy Rivers South-West](#) program continues to collect and interpret biological, water quality and habitat data from rivers and their catchments.

Since 2017, the river health surveys have found 13 species of native freshwater fish and crayfish in the Warren River catchment and 14 species in the Donnelly River catchment. The river health assessments have led to an expansion of the known ranges for high-conservation-value aquatic species, for example:

- freshwater fish – the western mud minnow (*Galaxiella munda*) and Balston's pygmy perch (*Nannatherina balstoni*) (Figure 8) – were detected for the first time in the Manjimup Brook in the Upper Donnelly River subareas
- Balston's pygmy perch, pouched lamprey (*Geotria australis*), and Carter's freshwater mussel (*Westralunio carteri*) were identified for the first time within Barlee Brook.

Balston's pygmy perch and Carter's freshwater mussel are listed as vulnerable under the *Biodiversity Conservation Act 2016* (BC Act) and *Environment Protection and Biodiversity Conservation Act 1999*. Western mud minnow is listed as vulnerable under the BC Act.



Figure 8 Western mud minnow (left) and Balston's pygmy perch (right)

Out of 14 sites in the Warren-Donnelly area monitored for aquatic fauna and water quality, 11 indicated a slight decline in ecological condition between February 2017 and February 2020. The poorer ecological condition in 2020 was likely related to the relatively dry winter in 2019, and hence lower flows leading to a stressed system in the summer of 2020, whereas the winter preceding the 2017 sampling was relatively wet.

River health assessments are being undertaken again for this year and will be used to assess whether the aquatic biota and water quality have recovered to conditions similar to 2017.

## New environmental flow study sites

We have begun field investigations to identify suitable locations for additional environmental flow assessments (Figure 9) in the Smith Brook, East Brook, Manjimup Brook, Middle Donnelly and Upper Lefroy subareas. These assessments will identify ecologically important flow events in these catchments to assist us in evaluating how environmental flows are changing in response to climate change and increased water capture by dams, and how well downstream ecosystems are being maintained. The studies intend to provide local, site-specific environmental flow information that can also be applied to other catchments with similar characteristics.



Figure 9 Surveying ecological features and installation of water level loggers at two environmental flow study sites in the Warren River catchment.

## Collaboration with the National Environmental Science Program

We are collaborating with the National Environmental Science Program (NESP) Resilient Landscapes Hub on a three-year project (2023–26) in the Donnelly catchment, to understand the environmental and indigenous water needs of south-west rivers. The project will identify key cultural values through workshops and on-Country visits with Noongar Traditional Owners. The Cultural Advice Committee of the Karri Karrak Aboriginal Corporation and the traditional knowledge holders will be key partners in this project.

The project will also identify and map key permanent refuge pools and develop flow-biota relationships. We will work with NESP to consider their findings into our adaptive management approach.

## **Lower Donnelly River groundwater discharge area**

Downstream of Vasse Highway, river pools and areas of permanent flow in the lower Donnelly River and Barlee Brook support high ecological, cultural and social values. These permanent flows and pools are supported by groundwater discharge from the sedimentary aquifers of the southern Perth Basin downstream of the Darling Fault. The fault marks the boundary between the shallow granitic-gneiss bedrock and exposed rock of the Yilgarn Craton upstream, and the deep (10-15 km thick) sediments of the southern Perth Basin.

Since 2021, we have monitored discharge at various locations and conducted annual on-ground discharge measurements to understand the dynamics of the groundwater discharge area. In 2022, we partnered with the University of Western Australia to support a three-year PhD study to better understand groundwater discharge and potential changes to river pools and flows under a drier climate.

## **Forested catchments and management**

The plan states that access to water in mostly forested and conservation areas is permitted if legal access could be granted. Existing licencees and potential applicants would need to get approval from the Department of Biodiversity Conservation and Attractions (DBCA) and should consider that streamflow from forested catchments has reduced and will continue to reduce under climate change (DWER 2022, Hughes & Wang 2022). Changes in average annual rainfall, groundwater levels and streamflow have been observed following drought periods or particularly dry years in the south-west of Western Australia (Alilou et al. 2022).

We also note the Draft Forest Management Plan 2024-2033 is being finalised by the Conservation and Parks Commission (through DBCA). Through ongoing monitoring, we will support collecting streamflow information in forested catchments. In 2022, we upgraded and reinstated surface water and groundwater monitoring in the Lewin South and Lewin North catchments in upper Barlee Brook. In the 1980s, these catchments were used to research the impact of logging on salinity by measuring changes in surface water flows, groundwater levels and water quality (Martin 1986). We will use the data from these catchments to understand the impact of climate change on runoff from forested catchments. These sites (and others) may also be used in the future to assess the hydrological impacts of ecological forest thinning if investigated by other agencies.

# Water for public water supply

Historically, public water supply for the towns of Manjimup and Pemberton relied on catchment runoff captured in dams for its water source. Now, because of the impact of climate change, groundwater supplementation occurs.

## Completed and on-going activities

We are working with the Water Corporation on its source development plans and investigations for the Pemberton and Warren-Blackwood Regional Water Supply Schemes to determine if surface water take will be considered as part of meeting future demand. Water not required for future public water supply is not reallocated for self-supply use.

In some subareas, the allocation limit includes a volume reserved for future public water supply, referred to as the public water supply reserve component. In the 2018 *Donnelly River Allocation Statement*, the department removed a 500 megalitre public water supply reserve from the Record Brook subarea. A public water supply reserve is still in place in Four Mile Brook/Big Brook subarea and the need for this reserve will be further considered in collaboration with the Water Corporation.

# Water for salinity recovery

The plan was developed to complement salinity recovery measures that were being considered in 2012. Salinity along the Warren River at Bullilup and Wheatley Farm gauging stations indicate average annual salinity has remained steady or slightly increased since 1999. It is difficult to project how a drying climate will influence salinity levels in the Warren River. Lower rainfall may reduce groundwater recharge and lower saline groundwater discharge in the upper catchments as new groundwater equilibriums are established.

Most of the Warren River catchment is a gazetted clearing control area under the *Country Areas Water Supply Act 1947* (CAWS Act). The clearing of native vegetation in these areas is controlled to manage and prevent salination of water resources.

The department will continue to manage salinity through the administration of the CAWS Act. However, achieving a catchment recovery target of 500 mg/L by 2030 at Barker Road Crossing as stated in the plan is unlikely given the level of on-ground remediation work currently occurring.

## Completed and on-going activities

The department continues to meet its salinity management obligations through the CAWS Act, providing advice to stakeholders and maintaining an extensive salinity-monitoring network. The department's CAWS Act land estate continues to fulfil a salinity management role, including in areas where the land estate is utilised for bluegum or pine plantations.

# The next water allocation plan

This evaluation shows the allocation plan is appropriate for managing the current surface water resources of the Warren Donnelly catchments. However, under expected declines in rainfall and streamflow over the next 10–15 years, the current water resource objectives of the plan may not be met. The department will now begin developing a new Warren-Donnelly surface water allocation plan to address the challenges of climate change. The new water allocation plan will be developed in consultation with key stakeholder groups, including Traditional Owners, the horticultural industry, licensees, environmental groups, recreational groups, the local community and other government agencies. Part of this consultation will include reviewing the water resource objectives for the area.

Along with climate change, the need for a new water allocation plan is also underpinned by consideration of some key matters outlined below.

## Traditional Owners

There have been many important state determinations and strategies relevant to Traditional Owners in south-west Western Australia.

The Noongar people are formally recognised as the Traditional Owners of the South-West region of Western Australia. The *Noongar (Koorah, Nitja, Boordahwan) (Past, Present, Future) Recognition Act 2016*, proclaimed on 6 June 2016 to coincide with Western Australia Day, recognises the Noongar peoples' important relationship with the Noongar lands, and their significant and unique contribution to the heritage, cultural identity, community and economy of Western Australia (Department of Premier and Cabinet 2020).

In 2021, the department published an internal *Aboriginal Engagement Strategy* in recognition that we can do better in engaging with Aboriginal people through building relationships and trust through honesty. The strategy was followed by the publication of our [Innovate Reconciliation Action Plan 2022-2024](#). It focuses on the key principles of reconciliation – unity, race relations, historical acceptance, institutional integrity, equality and equity – to strengthen our partnerships, collaboration and understanding to empower Aboriginal and Torres Strait Islander peoples and communities.

We will ensure our next water allocation plan supports these commitments.

## Southern Forests Irrigation Reference Group

Secure and reliable access to water is vital for the horticultural industry in the Warren-Donnelly area. In October 2022, the State Government established the [Southern Forests Irrigation Reference Group](#) to explore practical measures to address climate change and provide water security for the horticulture industry.

The Reference Group's report makes 15 recommendations relating to water infrastructure, efficiency, and sustainable water policy. The Reference Group report and State Government's response are available on the Department of Primary Industry and Regional Development's [Water Security for Southern Forests Horticulture Industry webpage](#).

The Reference group report outline several water licencing and policy matters raised by the community. Some of these matters have been discussed in earlier sections of this evaluation and will be further considered in the development of the next water allocation plan.

## Water Reform Bill

We are advising the State Government on options for new water legislation and how this will assist in addressing the increasing complexity of water management in Western Australia. The [Water Reform Bill](#) is aimed at consolidating six water resource management Acts into one piece of contemporary legislation.

## Forestry

In 2021, the State Government announced the decision to end logging of native forests in the south-west of Western Australia by 2024. The decision is supported by the [Native Forest Transition Plan](#). The State Government is investing in expanding Western Australia's softwood plantations (mostly pine) and ensuring affected workers, businesses and regional communities are supported through the transition.

The department does not regulate the water used by non-irrigated plantations under the RIWI Act. We will continue to provide advice to decision-makers on commercial tree plantation proposals and will consider this in the next water allocation plan.

## Further information

If you would like to receive updates on the next water allocation plan, please register your interest by emailing [allocation.planning@dwer.wa.gov.au](mailto:allocation.planning@dwer.wa.gov.au)

For licencing information, please contact our Bunbury Region, phone 08 9726 4111.

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