



Esperance

groundwater allocation plan

Evaluation statement 2012–2020

Across the south-west corner of the state, from Geraldton to Esperance, groundwater is being affected by climate change. We take seriously the evidence of climate change and its effects on our precious groundwater resources. Groundwater is vital in Esperance as there is only one reliable fresh aquifer to supply the town and surrounding areas, the shallow Superficial aquifer.

Groundwater is used in Esperance to provide drinking water, irrigate parks, gardens, schools and caravan parks, in industrial processing, and for many other uses. It also supports the natural environment, including urban trees, wetlands and lakes.

With climate change, there is less rainfall recharging the Superficial aquifer in Esperance. Decreasing rainfall, combined with where and how groundwater is currently being taken, will cause the aquifer to become more saline if no action is taken, affecting its usability and longevity as a source for local use.

The Department of Water and Environmental Regulation (the department) is responsible for managing, licensing and protecting groundwater in Esperance.



We are working closely with licensed water users to:

- reduce abstraction in high-risk areas around the town
- support users to adopt water efficiency measures
- encourage the use of fit-for-purpose supplies to irrigate public open space
- maintain and adapt groundwater monitoring to track changes
- shift abstraction for public supply to the west of town and the lakes to reduce localised impacts.

This groundwater evaluation supplies a snapshot of how the Superficial aquifer is performing as use and climate have changed from 2012 to 2020. It also evaluates the Esperance groundwater area water management plan (the plan) published in 2007.

- The current state of the aquifer was assessed using data collected from:
- water level monitoring bores
- water quality sampling and saltwater interface monitoring bores
- metered groundwater use data.

The work carried out to assess the aquifer and evaluate the department's current management confirmed previously reported impacts from localised use continue to occur.

To address the impacts on groundwater and provide water security into the future, work has begun on changing how groundwater is abstracted and replacing the 2007 plan.

By planning, we can give certainty about any changes needed for water use and allow everyone time to adjust and keep groundwater in Esperance viable for years to come.



Esperance townsite West to GWA - Simon Neville

Improving how we manage water

Since 2012 the department has:

- completed detailed groundwater investigations in the Esperance area that precisely map the extent of the freshwater aquifer and the location of surrounding and underlying saline water
- confirmed a significant amount of water is available in the western extent of the Esperance groundwater area – this area has more than four gigalitres of accessible water for public water supply to support population growth
- supplied funding to the Shire of Esperance to minimise their reliance on freshwater supplies for non-potable uses, via State Government-funded grants
- improved our understanding of the relationship between taking groundwater, saltwater intrusion and saline upconing by assessing monitoring data and initiating a State Groundwater Investigation Program – Seawater Interface project
- used climate modelling to identify how much groundwater will be available as the climate continues to get hotter and drier
- surveyed people on how they use water on their gardens and finding out the proportion of homeowners that use a bore. Water used for stock and garden bores is not licensed, so we need to estimate and account for this use
- mapped areas that are at high risk of becoming saline because of upconing and saltwater intrusion. This will help us regulate and manage the impacts of groundwater use and dewatering
- worked collaboratively with Water Corporation on managing groundwater contamination to protect all water users and provide safe drinking water.



New irrigation infrastructure installed by the Shire of Esperance is best practice in water-efficient design



Groundwater is used to irrigate public open space in Esperance - Shire of Esperance

Status of the aquifer

The shallow Superficial aquifer is the only significant freshwater aquifer available to the Esperance community. The aquifer supplies the town with drinking water. The Shire of Esperance, local businesses and industry, other licensees and garden bores all share this same precious water source.

Saltwater intrusion

Monitoring shows groundwater salinity along the coastline and around the lakes, together with localised upconing of saline groundwater, is affecting the aquifer as a result of both climate change and abstraction. The trend is significant because it is restricting where and how groundwater can continue to be used. It is the most urgent groundwater issue in the area.

Figure 1 shows how abstraction can induce saline intrusion and upconing. The department is undertaking work, through the State Groundwater Investigation Program – Saltwater Interface project, to improve our understanding of the aquifer and how far the saltwater interfaces have moved, and to increase monitoring in the Esperance groundwater area.

We have developed a salinity risk map which shows where saline intrusion and upconing are present and are a risk to users (Figure 2). These locations were determined by combining groundwater monitoring, sampling, licensee data and aerial electromagnetic surveys. The department's investigations will continue to refine this map.

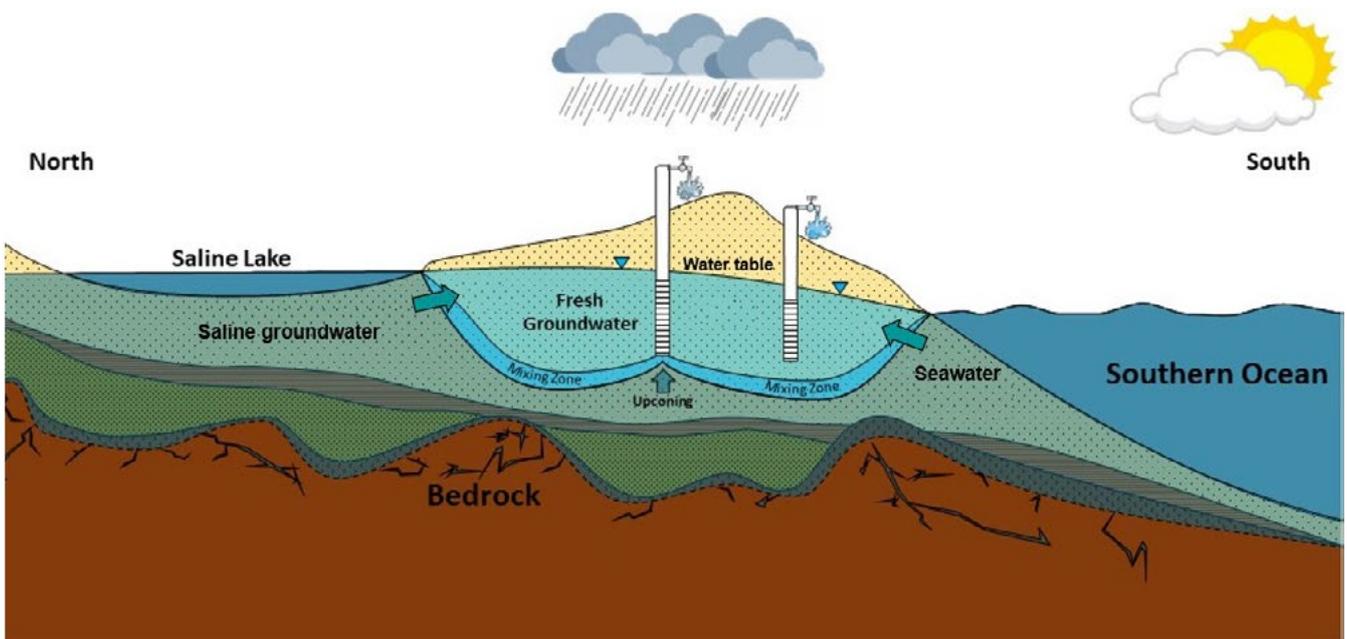


Figure 1: Current conceptual understanding and diagram of saltwater intrusion and saline upconing in Esperance townsite (not to scale)

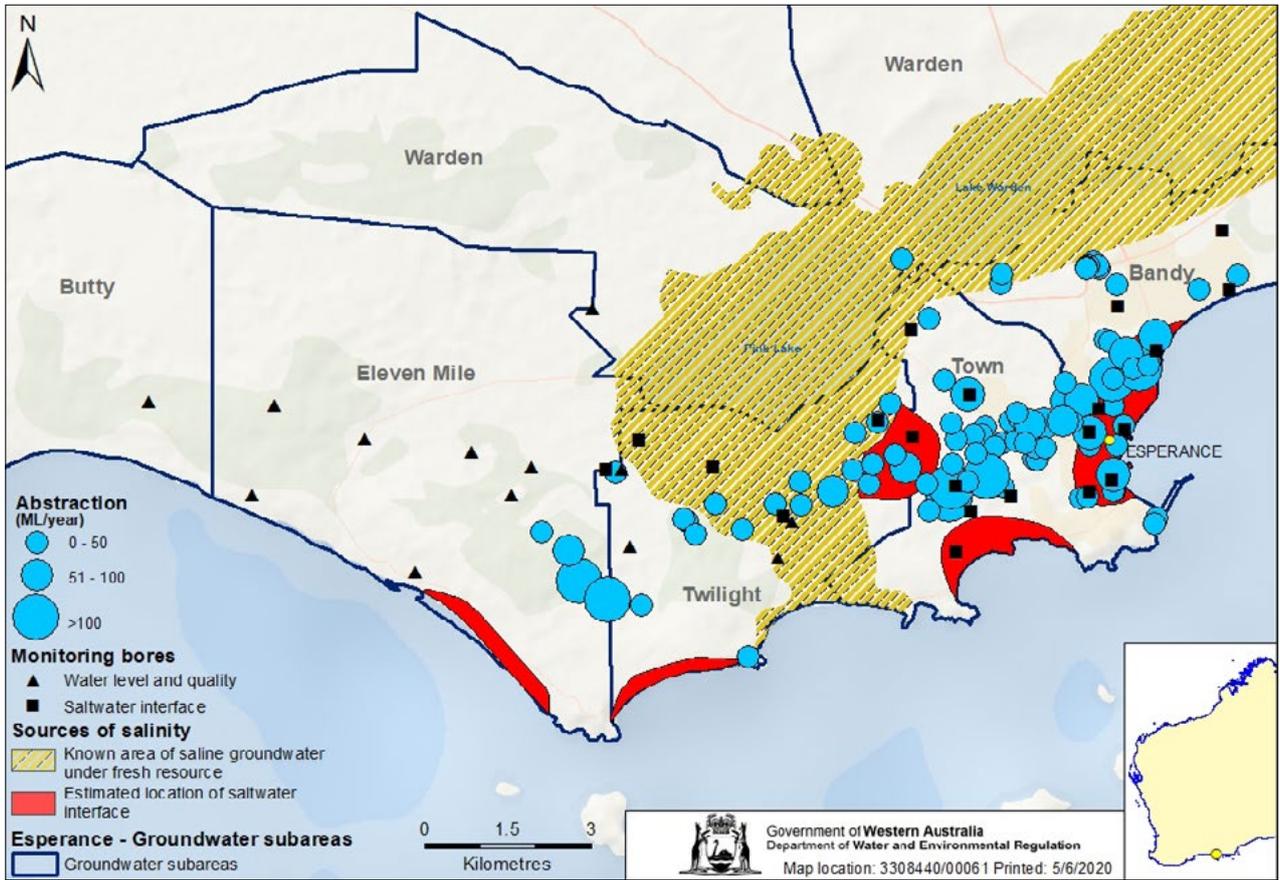


Figure 2: Current salinity risk areas



Aerial of Lake Warden

Groundwater levels

Figure 3 shows the area where climate change and local groundwater use has caused drawdown of groundwater levels to below sea level (0 m AHD). When groundwater levels drop below sea level it further increases the risk of drawing saltwater from the ocean and local saline lakes into the freshwater part of the aquifer.

The salinity changes and declining groundwater levels described above confirm that more water is being taken in and around the town of Esperance than can be sustained long-term with climate change.

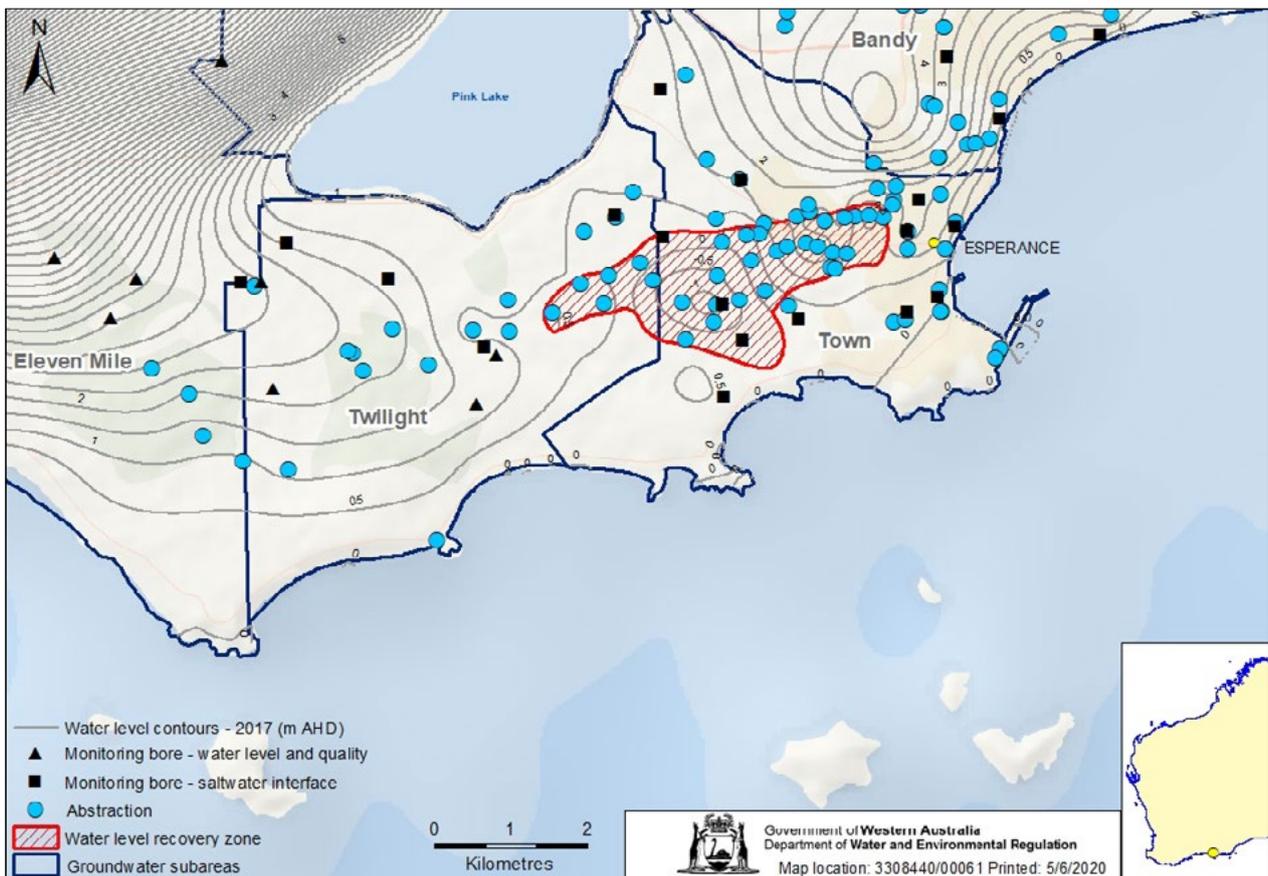


Figure 3: Water level contours (2017) and a water level recovery zone (which identifies the area where most abstraction is currently focused)

Groundwater-dependent ecosystems

Declining groundwater levels and increasing salinity are also a risk to groundwater-dependent ecosystems. Using vegetation mapping, depth to groundwater information and wetland assessments, we developed a risk map of these potential ecosystems, including the threatened Kwongkan shrubland ecosystem (see Figure 4).

Groundwater may also be supporting the internationally significant, Ramsar-listed, Lake Warden wetland system and other local wetlands of ecological, social, cultural and recreational importance.

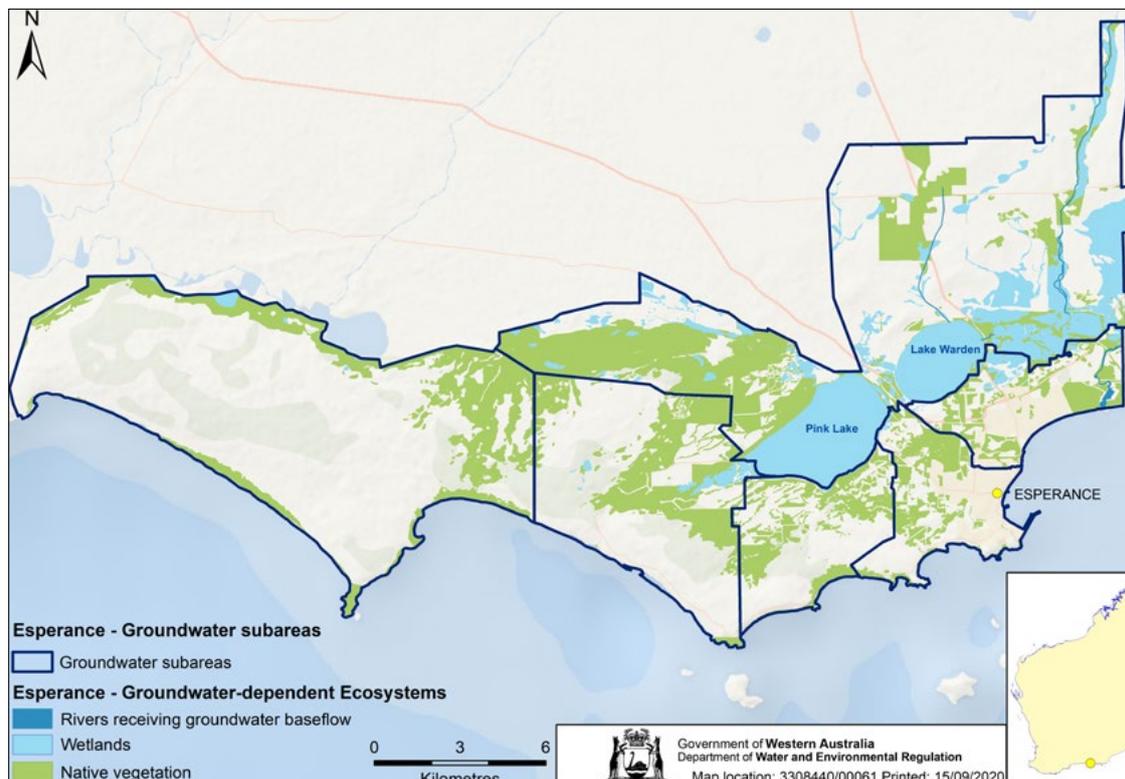


Figure 4 Potential groundwater-dependent ecosystems mapped in the Esperance groundwater area



Groundwater-dependent Kwongkan Shrubland in the Esperance groundwater area - Melanie Morcombe

Status of water use

Licensed groundwater use

The amount of groundwater licenced has remained stable over the past 10 years, with most taken for town water supply. Groundwater is also taken under licence to irrigate public open space and schools, used in industrial processing, and for recreation and tourism-based activities such as golf courses and caravan parks.

Historically, groundwater abstraction has been focused in the town area, and as shown in this evaluation it is having an impact on water quality. This cannot be sustained over the long-term with climate change. Reducing how much water is abstracted in this area (the water level recovery zone in Figure 3) will be necessary to recover local groundwater levels and to prevent further intrusion of the saltwater interfaces.

Groundwater use in the eastern and western subareas is still suitable, with sufficient amounts of water available to meet future demand.

Water Corporation and the Shire of Esperance have partnered to reuse tertiary-treated wastewater by localised infiltration of this water into the aquifer for storage and taking it back out when needed for irrigation. This managed aquifer recharge will reduce Esperance Shire's reliance on rain-fed groundwater to irrigate public open space. The use of water sourced from managed aquifer recharge has increased in the past few years to meet demand in Esperance.

Garden bores and stock watering

In Esperance using groundwater to irrigate home gardens and livestock, and for firefighting purposes, is exempt from licensing. The amount of water used for these purposes was not accounted for in the 2007 plan. In the town area and surrounding semi-rural areas this is a sizeable part of the total use of the aquifer.

We are incorporating up-to-date estimates of how much groundwater is used for garden bores and stock watering in our water planning. This information has been collected across the plan area using phone survey data and aerial mapping.





The use of groundwater from domestic garden bores for drinking is not recommended where scheme water is available. For areas where scheme water is not available the department's advice is that it is not safe to consume water from garden bores or other alternative water sources without proper testing, treatment and ongoing monitoring by an accredited and approved laboratory. You can find information on managing your garden bore using the following website links:

- [Domestic garden bores FAQs](#)
- Water quality protection note 41: [Private drinking water supplies](#) (April 2015)
- Water quality information sheet 1: [Safe use of bore water in rural areas](#) (January 2010)
- Contaminated groundwater — [could my garden bore be affected?](#)
- [Requirements for water licensing](#)

You can also find more information on the [Department of Health](#) or the [Department of Water and Environmental Regulation](#) websites.

Water carting

Support for drought relief and the supply of good-quality drinking water to outlying communities is important for the department and Water Corporation. Water Corporation carts water (when required) from the Esperance groundwater area to Salmon Gums, Grass Patch, Condingup, Hopetoun, Ravensthorpe and Munglinup. The amount supplied is a very small proportion of the drinking water provided for the town of Esperance.

Future demand

People will continue to need groundwater in future. The department expects that licensed use will remain relatively stable because the aquifer is at its limits. Current population growth projections predict that the largest future demand for groundwater will be for public water supply and garden bore use.

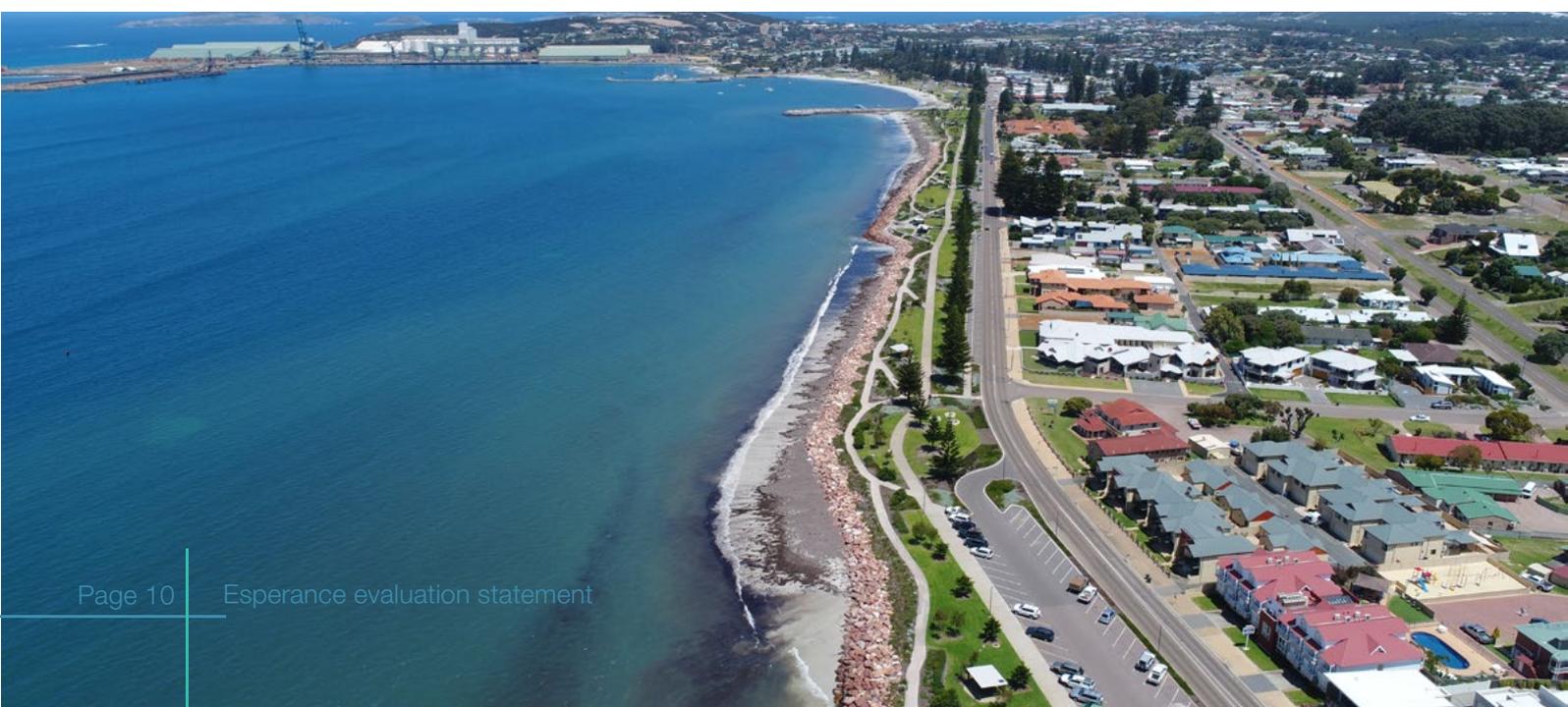
We are working closely with Water Corporation to secure public water supply for the town of Esperance.

This supply will be met by moving the take of groundwater into the western subareas and reducing take around the townsite in the water level recovery zone. Taking less public water supply from the town will not make more water available for other users, but will protect their ongoing security.

Urban growth in Esperance will put pressure on the aquifer if people continue to install garden bores. We will be working with the Shire of Esperance and Water Corporation to educate about, and manage, garden bore use in high-risk areas through the next plan.

All water users should respond to climate change by using the water that is available more effectively, including through improved irrigation technology, better design of green spaces, reducing leaks and wastage, and through water trading.

Esperance foreshore - Shire of Esperance



Updating how groundwater is allocated

Subarea changes to minimise impacts to groundwater

To respond to the water level and water quality issues raised in this evaluation the department has made an important initial step in managing groundwater, before the next plan is developed.

In the 2007 plan, the Esperance groundwater area was divided into four subareas to distribute water for licensing across the groundwater area (Figure 5a).

To better manage the future distribution of groundwater abstraction, subarea boundaries have been updated to align with our current understanding of geological and hydrogeological features.

The groundwater area is now divided into six subareas – Warden, Bandy, Town, Twilight, Eleven Mile and Butty (see Figure 5b).

This will not affect existing licensees but will ensure that future abstraction is distributed in a way that reduces the risk of saltwater intrusion.

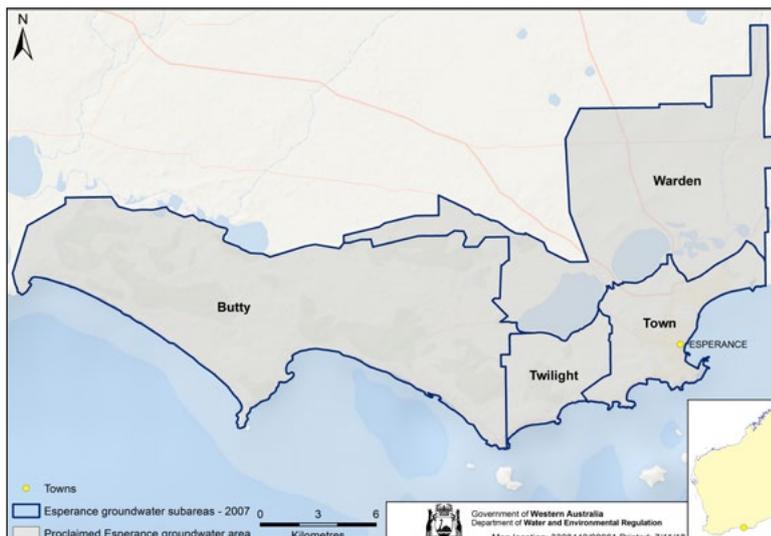
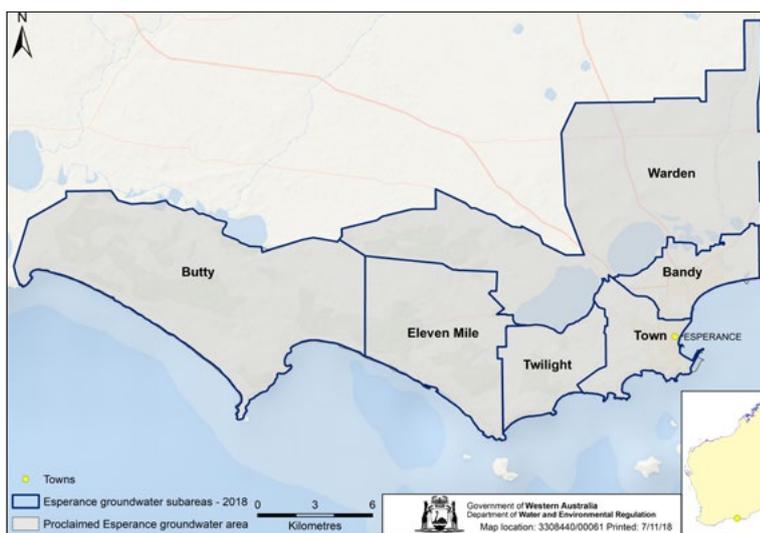


Figure 5a: 2007 subareas (above)

Figure 5b: 2020 subareas (below)





Lesser Sand Plover - Robyn Pickering, BirdLife Au

Our response and future planning

The 2007 Esperance plan provided a guide for managing groundwater allocation in this area. Over the past 10 years, our understanding of groundwater in Esperance, and how we regulate its use through planning and licensing, has evolved beyond the scope of this plan. The groundwater challenges described in this evaluation mean it is time to develop a new water allocation plan for Esperance that will:

- account for the effects of climate change on groundwater recharge and set new allocation limits using the latest future climate modelling
- confirm security of fresh groundwater supply to 2040
- maximise groundwater availability where it can be taken safely and sustainably
- restrict intrusion and upconing of the seawater and saline groundwater.

A salinity management framework will be included in the plan to guide the department's licensing and compliance decisions. This framework will set targets, triggers and thresholds for water level and salinity in production, and monitoring bores, throughout the groundwater area.

We anticipate the new plan being available for public comment in 2022.

Further information

Your voice is an integral part of our allocation planning process and we will continue to keep people informed of our work in the Esperance groundwater area, providing a variety of opportunities to have input.

For licensing information, please phone our South Coast Regional office in Albany on 9841 0100. You can also view the latest water allocation and availability information through our [water register](#) via our website.

If you would like to receive updates on the next Esperance groundwater allocation plan, please register your interest by emailing allocation.planning@dwer.wa.gov.au.