Gingin surface water allocation plan: Evaluation statement 2011-2012

The Department of Water released the *Gingin surface water allocation plan* in April 2011 in response to community concerns about low flows in the Gingin Brook. This allocation plan took the first step in responding to the drying climate by capping water use and recovering unused entitlements.

Evaluation statements are part of the Department of Water's adaptive management approach and allow us to continually review and improve management of water resources. This statement evaluates the extent to which the objectives of the *Gingin surface water allocation plan* have been met since its release to November 2012.

This is the first evaluation statement for the *Gingin surface water allocation plan*. It presents an assessment of the resource condition and identifies how we will adapt our management to ensure the plan's objectives continue to be met.

The objectives of the plan are:

1. Maintain the capacity of the resources to supply water for use.
2. Maintain sufficient flow regimes (summer and winter) in a changing climate to minimise the risk to the riverine environment.
3. Recover over-allocated resources to within the allocation limit.
4. Increase efficient use of the limited water available during low flow periods.

1 Allocation status

1.1 Changes in allocation status

There are 12 surface water resources in the plan area. No water has become available for licensing over this evaluation period (Table 1).

To manage the risk of further impacts of pumping on water users and the brook, we have successfully recouped unused entitlements from five resources. Consistent with the plan's recovery strategy, these volumes are not being made available for use.

All licensing statistics presented below were taken from our water licensing database on 20 November 2012.

For a full list of up-to-date water availability in all resources, contact the Swan Avon Regional office or see our water register, <www.water.wa.gov.au/ags/WaterRegister>.

Table 1 Resources where the allocation status changed between 2011 and November 2012 (kL/yr)

Proclaimed area	Resource	Allocation limit (kL/yr)	Licensable component (kL/yr)	Licensed entitlements 2012 **	Allocation status 2011	Allocation status 2012
Swan River system	Lennard Brook	2 434 310	2 409 310	2 392 310	No water available	No water available**
Gingin Brook catchment area	Gingin Brook 2	130 975	105 975	102 725	No water available	No water available**
	Gingin Brook 3	75 414	63 972	63 380	No water available	No water available**
Moore River and certain tributaries	Gingin Brook 6	under review	under review	0	No water available	No water available*
	Gingin Brook 7	under review	under review	0	No water available	No water available*

* The allocation limits for Gingin Brook 6 and 7 are under review. See Tables 2 and 3 for details.

** Licensed entitlements have been recouped to below the allocation limit. In line with the recovery strategy we are not allowing this water to be allocated out because streamflow is continuing to decline. We will reduce allocation limits as a result of this evaluation in these resources.

LEGEND

- Water available: ≤70% of resource allocated
- Limited water available: 70-<100% allocated
- Fully-allocated, no water available: 100% allocated
- Over-allocated, no water available: >100% allocated

1.2 Over-allocated resources

Over-allocated resources are those where the total of licensed entitlements exceed the total volume of water available for licensing.

The total volume of water is reducing as rainfall declines, so the allocation limits in the Gingin surface water area were set to prevent additional abstraction above current entitlements and enable the recoup of unused entitlements. Recouped volumes are not being made available for use. This strategy is the first step to bring abstraction to a more sustainable level that reflects current climate.

Two resources remain over-allocated (Table 2).

Table 2 Over-allocated resources in the Gingin surface water allocation area as at November 2012

Proclaimed area	Resource	% Allocated		Comments
		2011	2012	
Gingin Brook catchment area	Moondah Brook	111%	111%	No change
	Gingin Brook 1	111%	111%	No change

2 Resource status

2.1 Monitoring

To assess trends for the Gingin surface water area and help evaluate our management, we have analysed:

- **Rainfall** at two meteorological stations, one east at Gingin (9018) and one west at Bookine Bookine (509169)
- **Streamflow** at three gauging stations. On Lennard Brook, Molecap Hill gauge (617165); at Gingin town site, Gingin gauge (617058); near the confluence with Moore River, Bookine Bookine gauge (617003).

2.2 Rainfall

Rainfall has declined in the Gingin surface water plan area. However, the decline varies seasonally and spatially across the catchment. Greater declines are observed in winter and west around the confluence with Moore River.

The comparison of the 1975–2011 and 2001–2011 data from Gingin and Bookine Bookine meteorological stations show respectively:

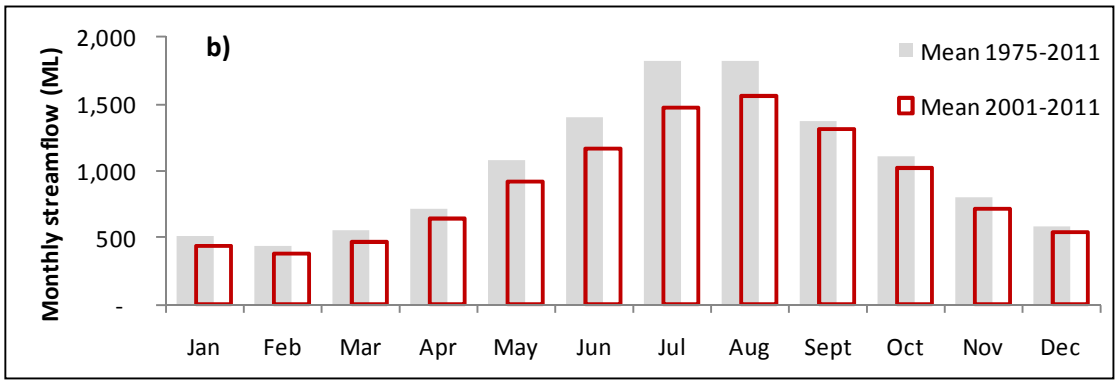
- total annual rainfall has declined between 5% and 10%
- summer rainfall is stable to declining by 9%
- winter rainfall has declined between 6% and 10%.

2.3 Streamflow

Gingin Brook: gauging station (617058)

The comparison of 1975–2011 and 2001–2011 streamflow data for upper Gingin Brook shows:

- annual decline of 12%
- summer decline of 12%
- winter decline of 13%.



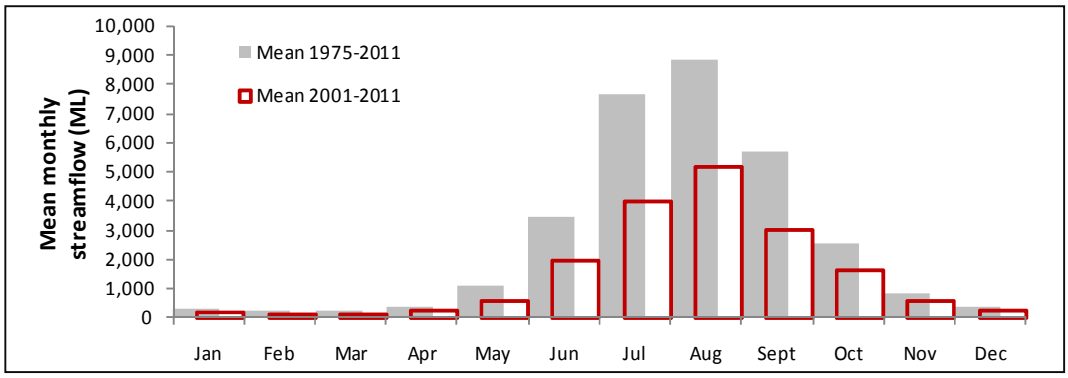
Daily flow compared from 1975–2011 and 2001-2011 shows:

- the maximum daily flow reached has declined by 38% from 320 ML to 200 ML
- the brook is perennial at this gauge, the minimum daily flow (volume exceeded 100% of the time) has not changed from 5 ML
- the median flow (flow exceeded 50% of the time) has declined by 11%, from 28 ML to 25 ML.

Bookine Bookine: gauging station (617003)

The comparison of 1975-2011 and 2001-2011 streamflow data for lower Gingin Brook shows:

- annual decline of 44%
- summer decline of 39%
- winter decline of 44%.



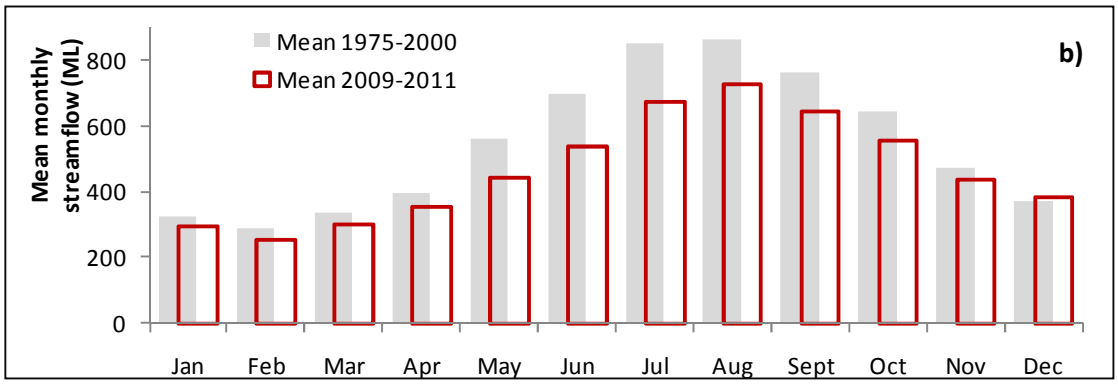
Daily flow compared from 1975-2011 and 2001-2011 shows:

- the maximum daily flow reached has declined by 65% from 2413 ML to 838 ML
- summer baseflow can be extremely low at this gauge station. The minimum flow of 0.1 ML (volume exceeded 100% of the time) has not changed
- the median flow (flow exceeded 50% of the time) has declined by 35%, from 26 ML to 17 ML.

Molecap Hill: gauging station (617165)

It is important to note that this gauge station was closed from 2001-2009 and as a result, no flow data was recorded during this period. Current data is only available from the last three years (2009-2011) after the gauge reopened. This means that the comparison of the last three years to the 1975-2000 period should be viewed with caution until additional years of data are collected. The comparison does show:

- annual streamflow decline of 14%
- summer decline of 6%
- winter decline of 18%.



Daily flow compared from 1975–2000 and 2009–2011 shows:

- the maximum daily flow reached has declined by 62% from 108 ML to 40 ML
- the brook is perennial at this gauge station. The minimum daily flow (volume exceeded 100% of time) increased from 3 ML to 7 ML
- the median flow (flow exceeded 50% of the time) has declined by 12%, from 16 ML to 14 ML in the last three years.

2.4 Critical low flow thresholds

The critical low flow thresholds were set to represent the point at which the brooks may be under stress and impacts on environmental values or water users are likely. The thresholds in the plan are:

- Gingin Brook 10 ML/day for two consecutive days at gauging station 617058
- Lennard Brook 5 ML/day for two consecutive days at gauging station 617165.

Over the 2011–2012 summer period, flow in Gingin Brook was below the threshold for a total of 53 days. Four days were single-day events, the remaining days fell into three spells of two or more consecutive days:

- 1st = 10 days
- 2nd = 11 days
- 3rd = 28 days.

These spells occurred between January and March 2012.

Over the 2011–2012 summer period, flow in Lennard Brook did not go below the threshold for any period of time.

As committed to in the plan, we completed an ecological assessment of Gingin and Lennard brooks in 2011. The outcome is revised low flow thresholds for Gingin and Lennard brooks. Details are in tables 3 and 5.

2.5 Groundwater-surface water interaction

Streamflow in Gingin Brook is maintained by groundwater discharge. The department's 2011 investigation of groundwater-surface water interaction in Gingin confirmed that groundwater discharges to Gingin Brook from the Superficial, Mirrabooka, Leederville and Leederville–Parmelia aquifers.

In the last 10 years, annual rainfall across the catchment has reduced by up to 10%. This has significantly reduced rainfall recharge to groundwater aquifers and caused declines in groundwater levels. This has reduced groundwater discharge to Gingin Brook and contributed to the decline in streamflow in the brook.

The *Gingin groundwater allocation plan for public comment* sets allocation limits to maintain groundwater discharge to Gingin Brook by leaving 80% and 40% of recharge *in situ* in the Mirrabooka and Leederville resources. The groundwater plan also has a recovery strategy for over-allocated groundwater resources and local licensing policy to manage applications to take groundwater from resources that discharge to Gingin Brook.

We will continue work to understand the link between groundwater and surface water to support future management. The aim is to maintain streamflow in Gingin Brook by managing abstraction from both groundwater and surface water.

3 Management status

Details of our progress towards meeting the objectives of the plan are given in the following sections. Meeting the objectives is achieved by implementing the plan through the following mechanisms:

- licensing to the allocation limits
- licensing as per the approach in Chapter 4 of the plan, including the recovery strategy and local licensing policies
- monitoring the resource
- carrying out the actions specified in the plan.

Evaluating whether the objectives of the plan have been met or not allows us to identify and respond to new issues and adapt our management.

How we will respond to this evaluation is presented in Section 5.

3.1 Implementation actions

To meet the objectives of the plan, in addition to applying allocation limits, the recovery strategy, local licensing policy and monitoring, we have committed to complete a set of implementation actions. Progress and status on these actions is outlined below.

Table 3 Summary of progress towards actions for implementing the plan

	Action	Status	Evaluation
1	Assess streamflow monitoring data to identify the number of times per year that flow falls below the critical low flow thresholds at Gingin Brook and Molecap Hill gauging station.	Met	See Section 2.4.
2	Analyse streamflow monitoring data to identify changes in annual, monthly and daily streamflow at Gingin Brook, Bookine Bookine and Molecap Hill gauging stations.	Met	See Section 2.3. Rainfall and streamflow is declining. This justifies continued management using the recovery strategy in the plan.

	Action	Status	Evaluation
3	Collate water use information from licensees including: • metered data • recouped volumes • actual water use.	Met	Of the 25 surface water licensees in the plan area: • six have a groundwater licence • nine have meters, six are on Lennard Brook, two on Gingin Brook and one on Moondah Brook • metering data indicates there is no over-use • four metered users have a staged development condition on their licence which may explain under use. In Gingin Brook, streamflow is declining so we need to recoup unused entitlements because they pose a risk to other users and the environment if fully used. We recouped a total of 631 670 kL of unused entitlements this evaluation period. 616 170 kL from Gingin Brook and 15 500kL from Lennard Brook. Metered data indicates that about 40% of licensed entitlements are not currently being used. Further investigations are required to initiate recoups.
4	Conduct compliance surveys: • at licence renewal • for entitlement transaction applications (in areas where water has become available) • annually of at least three randomly selected licensees with entitlements over 50 000 kL/yr.	Met	Seven compliance surveys were completed during this evaluation period. Three were compliant and the licences were reissued. Four were non-compliant and recoup action was commenced and successful – three of these licences were cancelled and one has had the entitlement reduced. These recouped volumes will not be made available for licensing. One trade on Lennard Brook of a full licensed entitlement was completed in this evaluation period. No random compliance surveys were conducted.

Action		Status	Evaluation
5	Review an allocation limit when: • a volume of ≥ 150 000 kL is recouped in a resource • water is recouped so that total entitlements are below the licensable component of an allocation limit • the department receives evidence based complaints regarding low flow events • relevant new scientific or water use information becomes available.	Ongoing	Total of licence entitlements was reduced back below the allocation limit in five resources (Table 1) as a result of recouping unused volumes. Streamflow is declining so the recouped entitlements will not be made available for licensing and the allocation limits will be reduced to reflect the change. In Gingin brooks 6 and 7, recoups have resulted in 100% of the allocation limit being recovered. This has presented an opportunity for the department to investigate and set a sustainable allocation limit for these resources. Key findings from some initial assessment work include: • Gingin brooks 6 and 7 should be managed as one resource unit with one allocation limit. • No surface water is available for abstraction in Gingin brooks 6 and 7 during summer. • Abstraction can only occur during winter (June-October) • Streamflow at Bookine Bookine is projected to decline by 54% by 2020 under a future median-rainfall scenario. No water will be available from these resources while we consider the options for a sustainable allocation limit for these resources. We will make any water available as soon as we have concluded our assessment and will report any outcomes in the next evaluation.
6	Produce and publish an annual evaluation statement.	Met	This is the first evaluation statement for the *Gingin surface water allocation plan*.

	Action	Status	Evaluation
7	Improve the critical low flow thresholds to inform management of summer flows. As part of this, define: • the key ecological objectives • the water level and equivalent flow regime required to meet the key ecological objectives • which gauging stations will be used to assess compliance with the required flow regime • the appropriate management response if the flow and ecological objectives are not met.	Partially met	We have made significant progress in achieving this action. The ecological objective is to maintain longitudinal and lateral habitat connectivity along the length of the brooks to protect native fish and crayfish abundance. The 2011 ecological assessments of both Gingin and Lennard Brook provided the baseline information which we are building on to complete this action. The ecological assessment recommends revised flow thresholds to replace those in the plan: • Gingin Brook 8 ML/day • Lennard Brook 6.6 ML/day The recommended thresholds will be adopted for both brooks. Considering the existing flow threshold for Gingin Brook is being reached, we are doing additional summer monitoring of dissolved oxygen (DO). A low flow threshold that links streamflow and DO will provide a more accurate measure of risk to the riverine environment. There will be no change in our approach to management in this area until this work is complete. Options to manage licensed entitlements as flow continues to decrease will be investigated as part of future planning.
8	Investigate options for licensing take of water during the high flow (winter) period.	Partially met	Sustainable diversion limit is an option to set allocation limits for take during winter only. Recoup of licences in Gingin brooks 6 and 7 gave us an opportunity to investigate winter take sooner than expected. Abstraction restricted to winter is an allocation limit option we are considering for these resources (as outlined in Action 5).

3.2 New allocation issues

Subdivision of large properties along the brook into small blocks has the potential to increase the number of people seeking to access the brook for stock and domestic purposes. We will notify the Shire of Gingin of this potential issue and to ensure abstraction does not increase, we will suggest that foreshore reserves be established between subdivided land and waterways, or other provisions made to prevent further pumping.

4 Evaluation against the objectives

We use the performance indicators and objectives in the plan to evaluate how well we are managing water resources in the plan area.

4.1 Performance indicators

We evaluated the performance indicators in the plan using the allocation, resource and monitoring information presented in the previous sections.

Table 4 Summary of performance indicators

Performance indicator	Objective/s	Performance indicator met?	Evaluation
Flow does not drop below critical low flow thresholds.	b	Not met for Gingin Brook Met for Lennard Brook	See Section 2.4
There is sufficient flow for licensees to take their whole licence entitlement.	a	Partially met	No evidence based complaints of a low flow event were received by the department. Other complaints were received which we followed up on, but no further action was required. No licensees contacted us to report that they could not abstract from the brooks – we have used this as an indication that they can abstract their licence entitlement volume. Allocation limits for Gingin brooks 6 and 7 are under review. Streamflow was not sufficient for the licensees in these resources to abstract any of their licensed entitlement during summer. The licences were cancelled and the volumes have not been made available for use. Metering data tells us that some licensees do not abstract their full licence entitlement. As an outcome of this evaluation, we will investigate if this is due to low flow in the brooks or other reasons.
The volume of water abstracted does not exceed the volume of water allocated.	b	Met	Metering data from licensees suggests that users are not abstracting more than the volume they are entitled to from surface water. Not all licensees are metered. We consider this a low risk because the majority of licensees in the area have established water needs and use does not change from year-to-year.

Licensees comply with their licence conditions.	a–c	Partially met	Licensees identified as non-compliant had not met development conditions on their licence and advised they no longer intended to. This triggered compliance and enforcement action to recoup the unused portion of these entitlements. One licensee failed to submit meter readings so a letter of warning was sent. We followed up with a visit to the licensee to read the meter. It showed they were within their licensed entitlement and were compliant.
All unused water entitlements are recouped in over-allocated resources.	c	Partially met	We have successfully recouped unused entitlements in Gingin brooks 2, 3, 6, 7 and Lennard Brook. We have identified licensees that are not utilising their full entitlements through this evaluation. We will investigate the reasons for under-use and will initiate a recouping process.

4.2 Management trigger and response

The trigger and response mechanism is designed to provide an immediate response when low flow events may be linked to abstraction by licensees. The trigger is an evidenced-based complaint of low flow received from a water user in the plan area. The response is to review flows at the relevant gauging station and then investigate surrounding licensees and issue a direction to restrict pumping. In this evaluation period, no evidence-based complaints were received and the response was not triggered.

4.3 Evaluation against the objectives

To determine whether the objectives of the plan are being met, we looked at the status against the performance indicators in Table 4. The status of the plan objectives are listed in Table 5.

We rated our performance using the following system:

Code	Description
	70 to100% of performance indicators met
	40 to 70% of performance indicators met
	Less than 40% of performance indicators met

Table 5 Evaluation against the objectives

Objectives		Status	Evaluation
a	Maintain the capacity of the resources to supply water for use.	Met: Lennard Brook Not met: Gingin Brook	This objective was met for all resources except Gingin brooks 6 and 7. Flow appears to be sufficient for current use in upper Gingin and Lennard brooks. Metering data and compliance surveys indicate that some licensees are not abstracting their full licensed entitlement. Streamflow is declining and is projected to decline further in the future (see Section 2.5 and Table 3). Therefore, unused entitlements pose a risk to the riverine environment if abstraction increases to the total of licensed entitlements. The *Gingin groundwater allocation plan for public comment* sets allocation limits and policy to limit and manage groundwater abstraction from aquifers that discharge to the brooks.
b	Maintain sufficient flow regimes (summer and winter) in a changing climate to minimise the risk to the riverine environment.	Met: Lennard Brook Not met: Gingin Brook	Based on the existing low flow thresholds, this objective was met for Lennard Brook and not met for Gingin Brook. The existing thresholds have been reviewed and changed so they are now linked to ecological values, and are a more accurate measure for this objective. Refer to Table 3 and Action 7 for details of the new low flow thresholds.
c	Recover over-allocated resources to within the allocation limit.	Partially met	The recovery strategy in the plan has been effective in allowing us to meet this objective. Declining rainfall, streamflow and projected future declines warrant our continued management using the recovery strategy.
d	Increase efficient use of the limited water available during low flow periods.	No performance indicator	There is no information to report against this objective at this stage. Recouping unused entitlements is a first administrative step in a recovery program. Assisting licensees to become more efficient with their water use is a second, more active step which will be an action for future planning.

5 Response to this evaluation

5.1 Adapting our management

We have identified management responses to improve our performance against the plan objectives through this evaluation. The responses are listed below in Table 6. They will be progressively implemented over the next evaluation period.

We will consult with relevant agencies and stakeholders when completing these responses and report on their status in the next evaluation. The management response is in addition to completing outstanding and ongoing implementation actions and our day-to-day licensing and regulatory activities.

Table 6 Management response to the 2011–2012 evaluation

Obj.	What did the evaluation tell us?	Response
a	Streamflow is sufficient in Lennard Brook and upper Gingin Brook to meet current use.	• Conduct a licence compliance survey to ground-truth under use and identify opportunities to recoup. Also identify changes in licensed surface and groundwater abstraction in the catchment. • Investigate a hydrological yield for Gingin Brook and Lennard Brook under a current and projected future climate. Incorporate catchment recharge, groundwater abstraction, discharge and surface water abstraction. • As part of future planning, investigate options to manage licensed entitlements as flow decreases.
	Given current and projected streamflow declines: • unused entitlements pose an unquantified risk to licensed users and the environment if fully used • use of surface water as a commercial source option is likely to become less reliable in the future – Gingin brooks 6 and 7 are an example of this.	
b	Although streamflow in Lennard Brook is currently sufficient to maintain health of the brook and provide water for use, streamflow is declining. This presents an increased risk of reduced reliability and potential ecological decline now.	• Begin to apply the recovery strategy to Lennard Brook. • Recouped entitlements will not be made available for licensing. No more water will be allocated from this system.
	Gingin Brook is showing signs of stress under current climate and abstraction.	• Continue to apply the recovery strategy to Gingin Brook. No more water will be allocated from this system.
	No water is available for abstraction during summer from lower Gingin Brook (Bookine Bookine).	• An allocation limit decision will be made for Gingin brooks 6 and 7 over the coming implementation period. The outcome will be reported in the next evaluation.

Obj.	What did the evaluation tell us?	Response
	The recovery strategy has been successful at recouping unused entitlements to prevent future over-use. However, given observed and projected streamflow declines, this is not an adequate management response in the long-term to protect the ecology of the brooks.	This allocation plan is the first step to managing the surface water resource in this area. Its purpose is to cap abstraction and recoup unused entitlements – which we are continuing to do. There will be no change in our approach to manage surface water licensees until future planning work is complete. We have taken a second step and recognised the groundwater-surface water interaction and the importance of groundwater discharge to maintain baseflow. Management of streamflow in Gingin Brook is linked to the management of groundwater in the *Gingin groundwater allocation plan for public comment*. The groundwater plan sets allocation limits that account for this interaction from aquifers that discharge to Gingin Brook and sets local licensing policies to manage abstraction near the brook. A future planning step is to look at actual abstraction and adapt our management given the declining streamflow. This will involve close community consultation to work out what values the community want to maintain (abstraction and/or environmental) and the management required to maintain these values. This will require targeted community engagement.
c	We have made good progress on recouping of unused entitlements.	We will continue to implement the recovery strategy and extend it to include Lennard Brook. Reduce allocation limits to reflect recoups in Gingin brooks 2 and 3, and Lennard Brook as per the recovery strategy in the plan.
	We have identified other licences that are not fully used but are uncertain of the reasons why.	Conduct a licence compliance survey to ground-truth under use and identify opportunities to recoup (same response as for Objective a)
	Streamflow is declining, therefore, we may need to adapt the recovery strategy to manage abstraction.	See response to Objective b.

Obj.	What did the evaluation tell us?	Response
d	We have no evidence of water use efficiency measures being adopted by surface water users in this plan area.	Using best practice, water use efficiency is an essential component of water management in a drying climate. Irrigators need to do more with less water – increasing efficiency is the way to achieve this. We will work with licensees in the Gingin surface water plan area to discuss their options as streamflow decreases. The Department of Agriculture and Food WA has offered to provide the "water wise on the Farm" initiative to help those irrigators seeking to improve efficiency. We will continue to improve our communication with licensees, riparian users and stakeholders. We will promote self-management through education rather than regulation. The aim is licensees continue to abstract during low flow periods with a reduced risk to the health of the brooks.

5.2 Future planning

The *Gingin surface water allocation plan* was a first step in managing the surface water resources in this area. Its purpose is to cap abstraction and not allow more water to be allocated out. The *Gingin groundwater allocation plan for public comment* will take a second step to maintain groundwater discharge to Gingin Brook.

The evaluation shows that the *Gingin surface water allocation plan* is suitable in the short-term. The department acknowledges that declining rainfall and streamflow is a significant issue in this area and that we will need to adapt management to focus on more efficient water use and maintaining the values of these surface water resources. Management will continue to focus on recouping unused entitlements and bringing allocation limits down to more sustainable volumes.