2019 Addendum

Mallee Horticulture Crop Report

2019

mallee
catchment management authority

Publication details

Publication Title: **2019 Addendum**

Publication Sub-Title: Mallee Horticulture Crop Report

September 2019

Acknowledgements

This report was supported by the Mallee CMA, through funding from the Victorian Government.

Cover image

Nangiloc region. Mallee CMA.

Mallee Catchment Management Authority

PO Box 5017 Mildura 3502
T: 03 5051 4377
E: info@malleecma.com.au
www.malleecma.vic.gov.au

Contents

List of maps

List of tables

List of figures

Executive summary

This report is an addendum to the 2018 Mallee Horticulture Crop Report prepared by SunRISE Mapping for the Mallee Catchment Management Authority. The 2018 Crop Report tracked irrigation development from 1997 to 2018 and evidenced renewed activity in redevelopment and expansion in the period from 2015 to 2018. This 2019 addendum tracks the extent of further irrigation expansion and redevelopment since 2018, from mid-2018 to mid-2019.

The study area for this addendum report is the Vic. Murray-Mallee, being irrigated horticulture in the Mallee catchment, along the Murray River from Woorinen South to the South Australian border. It does not include irrigation in the Murrayville Groundwater Management Area as per the 2018 Crop Report.

Key findings from the report

Crop type changes 2018 to 2019

Almond trees were the dominant crop across the Vic. Murray-Mallee in 2018 and 2019.

In each of the eleven study areas, the dominant crop remained the same in 2019 as it was in 2018, except for the Red Cliffs and Merbein irrigation districts. The dominant crop in Red Cliffs changed from wine grape plantings to table grapes, and in Merbein it changed from dried grapes to table grapes.

The main changes to crop types across the Vic. Murray-Mallee, from 2018 to 2019, were:

1. Almond plantings increased by 1,230 ha, a 5% increase from 24,485 ha to 25,715 ha. The net increase of 1,230 ha was the balance of 195 ha removed and 1,425 ha of new plantings. New and redeveloped plantings were mainly in the private diverter river reaches, Wemen (740 ha), Boundary Bend (270 ha), Nyah (210 ha), Darling to SA (155 ha), and Colignan to Koorlong (35 ha).
2. Table grape plantings increased by 655 ha, a 7% increase from 8,965 ha to 9,620 ha. The net increase of 655 ha was the balance of approximately 265 ha removed (likely being redeveloped) and 920 ha of new or redeveloped plantings. New or redeveloped plantings were mainly in the Mildura irrigation district (230 ha), Wemen river reach (170 ha), Red Cliffs irrigation district (145 ha), Colignan to Koorlong river reach (110 ha), Merbein irrigation district (100 ha) Boundary Bend river reach (90 ha) and Robinvale district (50 ha). The figures for Wemen, Boundary Bend and Robinvale are conservative as the resolution of the 2019 imagery was too course to detect all new development.
3. Wine grape plantings increased by 265 ha, a 3% increase from 8,070 ha to 8,335 ha. The net increase of 265 ha was the balance of 245 ha removed and 510 ha of new or redeveloped plantings. New or redeveloped plantings were mainly in the private diverter river reaches, Colignan to Koorlong (240 ha) and Nyah (155 ha).
4. Nut trees other than almonds, mainly pistachios, increased by 250 ha, a 51% increase from 490 ha to 740 ha. New plantings were in the Nyah river reach (120 ha), Wemen reach (80 ha), Boundary Bend reach (25 ha), Merbein irrigation district (15 ha) and Red Cliffs district (10 ha).
5. Citrus plantings increased by 190 ha, a 5% increase from 4,135 ha to 4,325 ha. The net increase of 190 ha was the balance of 145 ha removed and 335 ha of new or redeveloped plantings. New or redeveloped plantings were mainly in the Colignan to Koorlong river reach (255 ha).
6. Dried grape plantings decreased by 160 ha, a 5% decrease from 3,125 ha to 2,965 ha. The net decrease of 160 ha was the balance of 290 ha removed and 130 ha of new or redeveloped plantings. New or redeveloped plantings were in the Mildura irrigation district (35 ha), Red Cliffs district (35 ha), Colignan to Koorlong river reach (35 ha) and the Merbein district (25 ha).

Key findings from the report

Irrigation development – new and retired areas 2018 to 2019

From mid-2018 to mid-2019, the irrigable area in the Vic. Murray-Mallee increased by 2,470 ha, a 3% increase from 78,775 ha to 81,245 ha. This rate of expansion, 2,470 ha/year, is on a par with the average expansion rate from 2003 to 2006 of 2,562 ha/year, which is the second highest growth rate since 1997. The highest growth rate was from 2006 to 2009, with an average of 4,322 ha/year.

The net increase of 2,470 ha was the balance of 2,515 hectares expansion and 45 hectares retired from irrigation. 99% of expansion occurred in the private diverter river reaches, predominantly Wemen (895 ha), Boundary Bend (660 ha), Nyah (470 ha) and Colignan to Koorlong (270 ha).

Planting trends - permanent plantings, seasonal crops and vacant areas

Changes in the area of permanent plantings, seasonal crops and vacant (not irrigated) areas from 2018 to 2019 were as follows:

- Permanent plantings increased by 2,500 ha, a 5% increase from 55,425 ha to 57,925 ha. The increase in permanent plantings was mainly in the Wemen river reach (980 ha), Nyah reach (505 ha) and Colignan to Koorlong reach (375 ha).
- Seasonal crops decreased by 105 ha, a 1% decrease from 10,990 ha to 10,885 ha.
- Vacant, previously irrigated permanent plantings, decreased by 600 ha, a 9% decrease from 6,475 ha to 5,875 ha. 405 ha of the decrease were in the private diverter river reaches and 195 ha in the irrigation districts.
- Vacant, previously irrigated seasonal cropping, increased by 675 ha, an 11% increase from 5,885 ha to 6,560 ha.

Irrigation methods 2018 to 2019

Drippers remained the dominant irrigation method from 2018 to 2019 in each of the eleven study areas, except for the Robinvale district where lowlevel sprinklers were dominant in 2018 and 2019.

Drip irrigation increased by 2,575 ha, a 5% increase from 47,060 ha to 49,635 ha while gravity systems (furrow and flood) decreased by 270 ha, a 12% decrease from 2,260 ha to 1,990 ha.

There was little change from 2018 to 2019 in areas irrigated with low level or overhead sprinklers; low level sprinklers increased by 85 ha and overhead irrigation increased by 5 ha.

Salinity impact zones 2018 to 2019

The dominant salinity impact zone across the Vic. Murray-Mallee was the lowest impact zone, L1, in 2018 and 2019. Expansion from 2018 to 2019 mainly occurred in L1; 84% in L1, 9% in L2, less than 1% in L3, 6% in L4 and less than 1% in HIZ. Expansion in HIZ was development on existing irrigation properties.

From 2018 to 2019, the irrigable area in HIZ decreased by 25 ha, a less than 1% decrease from 10,590 ha to 10,565 ha, The net decrease of 25 ha was the balance of 30 ha retired from irrigation and 5 ha of new HIZ areas (expansion on existing irrigation properties). Areas retired from HIZ were mainly in the Mildura district (15 ha), Red Cliffs district (5 ha) and Mildura river reach (5 ha).

The area in LIZ (i.e. L1, L2, L3 and L4) increased by 2,495 ha, a 4% increase from 68,185 ha to 70,680 ha.

Introduction

This report is an addendum to the 2018 Mallee Horticulture Crop Report prepared by SunRISE Mapping for the Mallee CMA. The 2018 Crop Report tracked irrigation development from 1997 to 2018 and evidenced renewed activity in redevelopment and expansion in the period from 2015 to 2018.

This 2019 addendum tracks the extent of further irrigation expansion and redevelopment since 2018; i.e. from mid-2018 to mid-2019.

The study area for this report is the Vic. Murray-Mallee, irrigated horticulture along the Murray River from Woorinen South to the South Australian border (Map 1).

Method

SunRISE Mapping and Research - crop mapping

SunRISE crop mapping is based on scale accurate aerial imagery, along with input from irrigators and industry.

Imagery for mapping irrigated horticulture is ideally, high-resolution, aerial photography, captured in January or February of the season represented. For example, the 2018 crop mapping, representing the 2017-18 season was from aerial photography captured January 2018.

The 2019 crop mapping was from several imagery sources that ranged in quality and resolution:

- Nearmap, high-resolution aerial imagery, captured 6th January and 10th April 2019 was available for the Mildura, Red Cliffs and Merbein districts, Mildura private diverters, and the northern end of the Colignan to Koorlong river reach. The imagery enabled detailed interpretation of 2019 status of irrigated areas.
- Google Earth satellite imagery, captured late 2018, or early 2019, was used across areas outside the Nearmap coverage, except for the Robinvale irrigation district and the Boundary Bend and Wemen river reaches where only 2016 Google Earth was available. Google Earth enabled good interpretation of 2019 status of irrigated areas, except for small areas of change and new/young plantings.
- Sentinel satellite imagery was the only 2019 imagery readily available from Boundary Bend to Wemen. It enabled only course interpretation of irrigation status. 2019 results for the Robinvale irrigation district and the Boundary Bend and Wemen river reaches should be treated as approximate only.
- Decipher biomass mapping provided monthly snap shots that assisted in assessing the status of seasonal cropping in 2019.

Definitions

The following definitions apply in this report.

Irrigable area Irrigable area is the irrigated area and vacant, not irrigated areas that were irrigated and still could be irrigated. Some vacant areas may eventually be retired or they may be in redevelopment. An increase in irrigable area can arise from new 'greenfield' development and/or from an increase in the area irrigated following redevelopment and the removal of furrow irrigation, drying racks etc.

Retired Areas 'retired' from irrigation have undergone a change in land use that precludes them from being irrigated. SunRISE generally relies on updated aerial imagery, or digital cadastre, for evidence of land use change such as residential development, buildings, sheds and dams. Areas set aside for conservation purposes are also 'retired' from the crop mapping. 'Retired' areas are excluded from the 'irrigable' area.

Vacant The crop mapping includes a crop type of 'vacant'. Vacant areas were irrigated, but not in the season that the crop mapping refers to. Where the vacant area was previously a permanent planting, it is termed **Vacant P**. Where the vacant area was previously a seasonal planting, such as pasture or vegetables, it is termed **Vacant S**.

Salinity impact zones Salinity impact zones are mapped zones in north-west Victoria that correlate to tonnes of salt displaced to the Murray River from new irrigation. Salinity impact zones in this report refer to 'Salinity Offset Charging Zones'; comprising four low impact zones (L1, L2, L3 and L4) and one high impact zone (HIZ).

Charging zones are used to determine levy charges for new developments, and have been used in this study, for ease of presentation, rather than the twelve 'Salinity Accountability Zones' (seven low impact zones and 5 high impact zones) which are used for reporting river salinity impacts to the Murray-Darling Basin Authority (salinity register).

Table 1 shows the relationship between salinity offset charging zones and salinity accountability zones.

Table 1: Salinity impact zones

	Salinity offset charging zones	Salinity accountability zones
Low salinity impact zones	L1	LIZ 1, LIZ 2
	L2	LIZ 3
	L3	LIZ 4, LIZ 5
	L4	LIZ 6, LIZ 7
High salinity impact zones	HIZ	HIZ 1, HIZ 2, HIZ 3, HIZ 4, HIZ 5

Crop type descriptions

Table 2 describes the main crops irrigated in the Vic. Murray-Mallee and how they are classed for reporting.

Table 2: Description of irrigated crop types and categories

	Crop type	Category	Description
Permanent plantings	Grapevine	Dried	
		Table	
		Wine	Includes a very small proportion of juiced grapes
	Citrus		Grapefruit, lemon, lime, mandarin, navel, blood orange, other, pummelo, tangelo, valencia
	Fruit tree	Olive	
		Other	Avocado, date palm, fig, jujube, mango, persimmon, pome fruit, pomegranate, stone fruit
	Nut tree	Almond	
		Other	Pistachio, walnut
	Other	Miscellaneous	Aquaculture, flowers, herbs, mushroom, native plants, nursery, passionfruit, strawberry, tree plantation
	Permanent crops		
Seasonal crops	Field crop		Canola, cereal, cover crop, lucerne, lupin, maize, pasture, turf etc.
	Vegetable	Carrot	
		Potato	
		Other	Asparagus, bean, beetroot, broccoli, cabbage, capsicum, cauliflower, chili, cucumber, eggplant, garlic, lettuce, melon, onion, pea, pumpkin, salad greens, sweet corn, tomato, zucchini
	Seasonal crops		
	Vacant P		Vacant (not irrigated), previously an irrigated permanent planting
	Vacant S		Vacant (not irrigated), previously an irrigated seasonal crop

Irrigation type descriptions

Irrigation methods are grouped as drip, lowlevel, overhead and furrow as described in Table 3.

Many irrigators use dual systems, such as drip with overhead sprinklers or cooling sprays; however, only the main irrigation method is used in this report.

Table 3: Description of irrigation methods

Irrigation method	Description
Drip	Including; subsurface-drip, trickle
Lowlevel	Including; micro jet, micro sprinkler, sprinkler, waterbird
Overhead	Including; pivot, travel (lateral move)
Furrow	Gravity systems including flood
Vacant	Vacant (not irrigated) areas that were previously irrigated and could still be irrigated

Study area

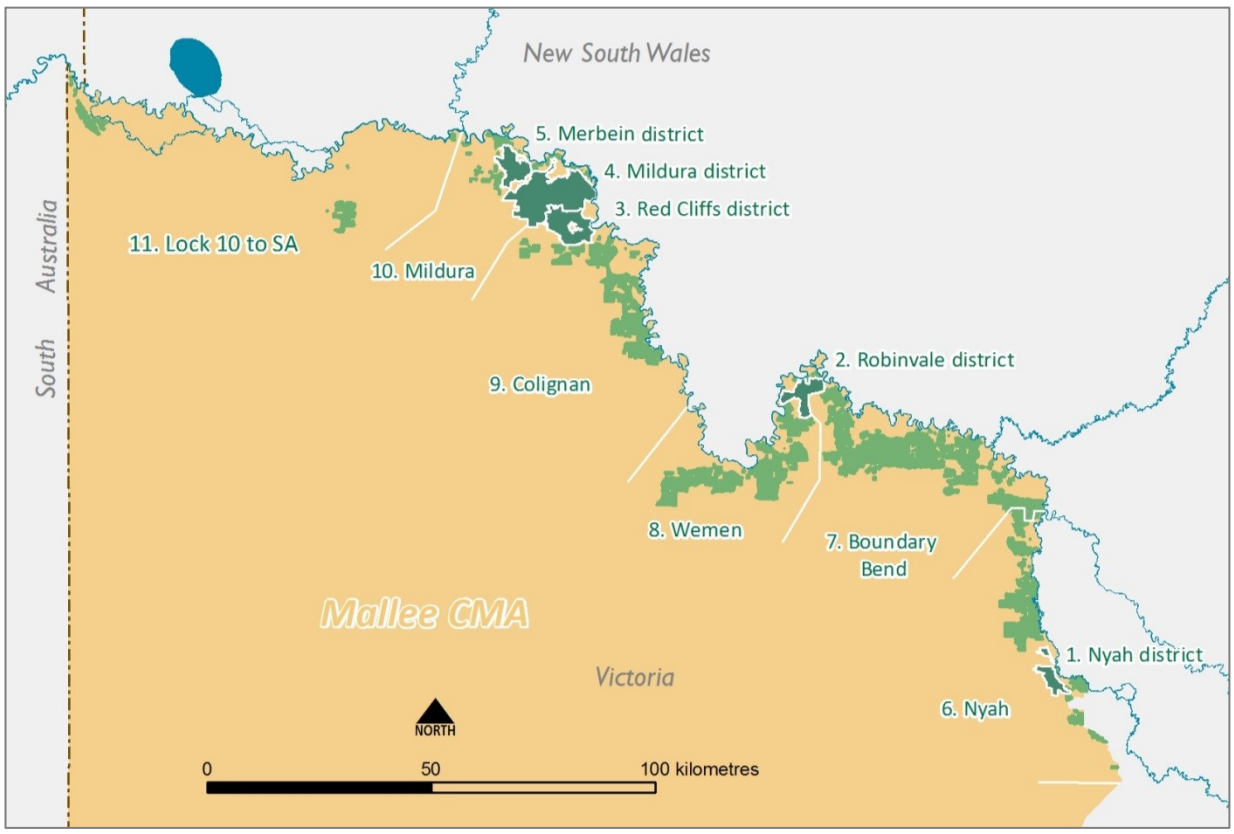
The study area is along the Murray River in the Victorian Mallee catchment. It covers five pumped irrigation districts and six river reaches of private diverters as shown in Map 1. It is referred to as the 'Vic. Murray-Mallee', as the study area does not include the Murrayville Groundwater Management Area (GMA). The study area in the 2018 Crop Report included the Murrayville GMA and was referred to as the 'Mallee catchment'.

Pumped irrigation districts

1. Nyah irrigation district
2. Robinvale irrigation district
3. Red Cliffs irrigation district
4. Mildura irrigation district
5. Merbein irrigation district

River reaches (private diverters)

6. Nyah river reach - Woorinen South to the Wakool River junction
7. Boundary Bend river reach - Wakool River junction to the Euston weir
8. Wemen river reach - Euston weir to Liparoo
9. Colignan river reach - Colignan to Yatpool
10. Mildura river reach - Mildura to Lock 10
11. Lock 10 to SA river reach - Lock 10 to the South Australian border



Map 1: Map of the eleven study areas in the Vic. Murray-Mallee

1. Vic. Murray-Mallee summary

In summary for irrigated horticulture in the Vic. Murray-Mallee from 2018 to 2019

Change in crop types from 2018 to 2019

Almond tree plantings remained the dominant crop type across the Vic. Murray-Mallee from 2018 to 2019.

The main changes in crop types from 2018 to 2019 were:

1. Almond plantings increased by 1,230 ha, a 5% increase from 24,485 ha to 25,715 ha. The net increase of 1,230 ha was the balance of 195 ha removed and 1,425 ha of new or redeveloped plantings. New and redeveloped plantings were mainly in the private diverter river reaches, Wemen (740 ha), Boundary Bend (270 ha), Nyah (210 ha), Darling to SA (155 ha) and Colignan to Koorlong (35 ha).
2. Table grape plantings increased by 655 ha, a 7% increase from 8,965 ha to 9,620 ha. The net increase of 655 ha was the balance of approximately 265 ha removed (likely being redeveloped) and 920 ha of new or redeveloped plantings. New or redeveloped plantings were mainly in the Mildura irrigation district (230 ha), Wemen river reach (170 ha), Red Cliffs irrigation district (145 ha), Colignan to Koorlong river reach (110 ha), Merbein irrigation district (100 ha) Boundary Bend river reach (90 ha) and Robinvale district (50 ha). The figures for Wemen, Boundary Bend and Robinvale are conservative as the resolution of the 2019 imagery was too course to detect all redeveloped plantings.
3. Wine grape plantings increased by 265 ha, a 3% increase from 8,070 ha to 8,335 ha. The net increase of 265 ha was the balance of 245 ha removed and 510 ha of new or redeveloped plantings. New or redeveloped plantings were mainly in the private diverter river reaches, Colignan to Koorlong (240 ha) and Nyah (155 ha).
4. Nut trees other than almonds, mainly pistachios, increased by 250 ha, a 51% increase from 490 ha to 740 ha. New plantings were in the Nyah river reach (120 ha), Wemen reach (80 ha), Boundary Bend reach (25 ha), Merbein irrigation district (15 ha) and Red Cliffs district (10 ha).
5. Citrus plantings increased by 190 ha, a 5% increase from 4,135 ha to 4,325 ha. The net increase of 190 ha was the balance of 145 ha removed and 335 ha of new or redeveloped plantings. New or redeveloped plantings were mainly in the Colignan to Koorlong river reach (255 ha).
6. Dried grape plantings decreased by 160 ha, a 5% decrease from 3,125 ha to 2,965 ha. The net decrease of 160 ha was the balance of 290 ha removed and 130 ha of new or redeveloped plantings. New or redeveloped plantings were in the Mildura irrigation district (35 ha), Red Cliffs district (35 ha), Colignan to Koorlong river reach (35 ha) and the Merbein district (25 ha).

Irrigation development - new and retired areas 2018 to 2019

From mid-2018 to mid-2019, the irrigable area in the Vic. Murray-Mallee increased by 2,470 ha, a 3% increase from 78,775 ha to 81,245 ha. This rate of expansion, 2,470 ha/year, is on a par with the average expansion rate from 2003 to 2006 of 2,562 ha/year, which is the second highest growth rate since 1997. The highest growth rate was from 2006 to 2009, with an average of 4,322 ha/year.

The net increase of 2,470 ha was the balance of 2,515 hectares expansion and 45 hectares retired from irrigation. 99% of expansion occurred in the private diverter river reaches, predominantly Wemen (895 ha), Boundary Bend (660 ha), Nyah (470 ha) and Colignan to Koorlong (270 ha).

In summary for irrigated horticulture in the Vic. Murray-Mallee

Planting trends - permanent plantings, seasonal crops and vacant areas

Changes in the area of permanent plantings, seasonal crops and vacant (not irrigated) areas from 2018 to 2019 were as follows:

- Permanent plantings increased by 2,500 ha, a 5% increase from 55,425 ha to 57,925 ha. The increase in permanent plantings was mainly in the Wemen river reach (980 ha), Nyah reach (505 ha) and Colignan to Koorlong reach (375 ha).
- Seasonal crops decreased by 105 ha, a 1% decrease from 10,990 ha to 10,885 ha.
- Vacant, previously irrigated permanent plantings, decreased by 600 ha, a 9% decrease from 6,475 ha to 5,875 ha. 405 ha of the decrease were in the private diverter river reaches and 195 ha in the irrigation districts.
- Vacant, previously irrigated seasonal cropping, increased by 675 ha, an 11% increase from 5,885 ha to 6,560 ha.

In 2019:

- 80% of permanent plantings were in private diverter areas, 20% in the irrigation districts;
- 88% of seasonal crops were in private diverter areas, 12% in the irrigation districts;
- 43% of vacant, previously permanent plantings, were in private diverter areas, 57% in the irrigation districts; and
- 88% of vacant, previously seasonal crops, were in private diverter areas, 12% in the irrigation districts.

Irrigation methods 2018 to 2019

Drippers remained the dominant irrigation method from 2018 to 2019 in each of the eleven study areas, except for the Robinvale district where lowlevel sprinklers were dominant in 2018 and 2019.

From 2018 to 2019 :

- Drip irrigation increased by 2,575 ha, a 5% increase from 47,060 ha to 49,635 ha.
- Lowlevel irrigation increased by 85 ha, a 1% increase from 8,495 ha to 8,580 ha.
- Overhead and pivot irrigation increased by 5 ha, a less than 1% increase from 8,600 ha to 8,605 ha.
- Furrow/flood irrigation decreased by 270 ha, a 12% decrease from 2,260 ha to 1,990 ha.

Salinity impact zones 2018 to 2019

The dominant salinity impact zone across the Vic. Murray-Mallee was the lowest impact zone, L1, in 2018 and 2019. Expansion from 2018 to 2019 mainly occurred in L1; 84% in L1, 9% in L2, less than 1% in L3, 6% in L4 and less than 1% in HIZ.
From 2018 to 2019 the irrigable area in:

- L1 increased by 2,070 ha, a 5% increase from 40,475 ha to 42,545 ha.
- L2 to L4 increased by 425 ha, a 2% increase from 27,710 ha to 28,135 ha.
- HIZ decreased by 25 ha, a less than 1% decrease from 10,590 ha to 10,565 ha. The net decrease of 25 ha was the balance of 30 ha retired from irrigation and 5 ha of new HIZ areas (expansion on existing irrigation properties). Areas retired from HIZ were mainly in the Mildura district (15 ha), Red Cliffs district (5 ha) and Mildura river reach (5 ha).

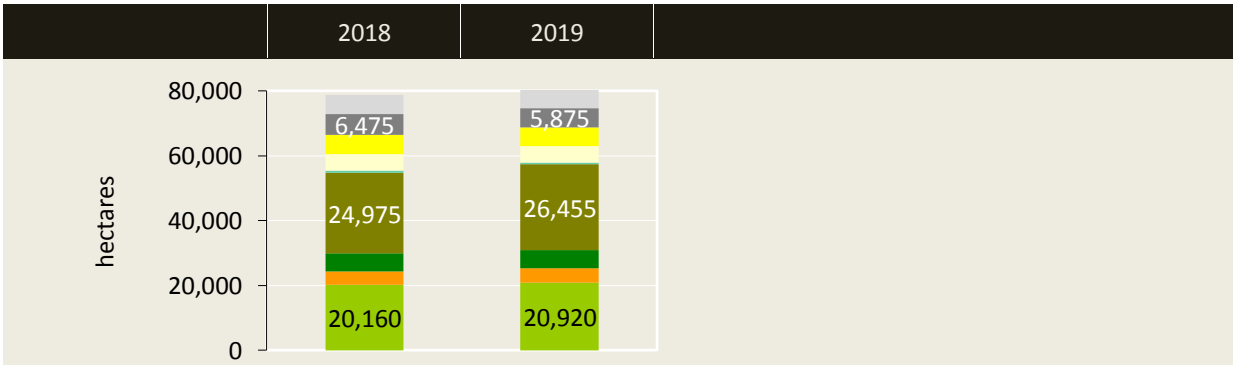
1.1 Vic. Murray-Mallee - crop types from 2018 to 2019

Figure 1 summarises the change in irrigated crops across the Vic. Murray-Mallee from 2018 to 2019.

Almond trees were the dominant planting in 2018 and 2019.

The main changes from 2018 to 2019 were:

1. Almond trees increased by 1,230 ha, a 5% increase from 24,485 ha to 25,715 ha.
2. Table grape plantings increased by 655 ha, a 7% increase from 8,965 ha to 9,620 ha.
3. Wine grape plantings increased by 265 ha, a 3% increase from 8,070 ha to 8,335 ha.
4. Other nut trees (mainly pistachios) increased by 250 ha, a 51% increase from 490 ha to 740 ha.
5. Citrus plantings increased by 190 ha, a 5% increase from 4,135 ha to 4,325 ha.
6. Vegetables decreased by 165 ha, a 3% decrease, the net result of a decrease in the area of carrots and vegetables other than potatoes. Potatoes increased by 95 ha.
7. Dried grapes decreased by 160 ha, a 5% decrease from 3,125 ha to 2,965 ha.



Crop type		2018	2019	% of 2019 total	Change (ha) 2018 to 2019	% Change 2018 to 2019
Permanent	Grape Dried	3,125	2,965	4%	-160	-5%
	Grape Table	8,965	9,620	12%	+655	+7%
	Grape Wine	8,070	8,335	10%	+265	+3%
	Citrus	4,135	4,325	5%	+190	+5%
	Fruit Olive	3,770	3,755	5%	-15	-<1%
	Fruit Other	1,800	1,865	2%	+65	+4%
	Nut Almond	24,485	25,715	32%	+1,230	+5%
	Nut Other	490	740	1%	+250	+51%
	Other	585	605	1%	+20	+3%
Seasonal	Field Crop	5,025	5,085	6%	+60	+1%
	Veg. Carrot	1,565	1,410	2%	-155	-10%
	Veg. Potato	1,740	1,835	2%	+95	+5%
	Veg. Other	2,660	2,555	3%	-105	-4%
	Vacant P	6,475	5,875	7%	-600	-9%
	Vacant S	5,885	6,560	8%	+675	+11%
Total (ha)		78,775	81,245	100%	+2,470	+3%

Figure 1: Vic. Murray-Mallee – change in crop types from 2018 to 2019

1.2 Vic. Murray-Mallee - planting trends

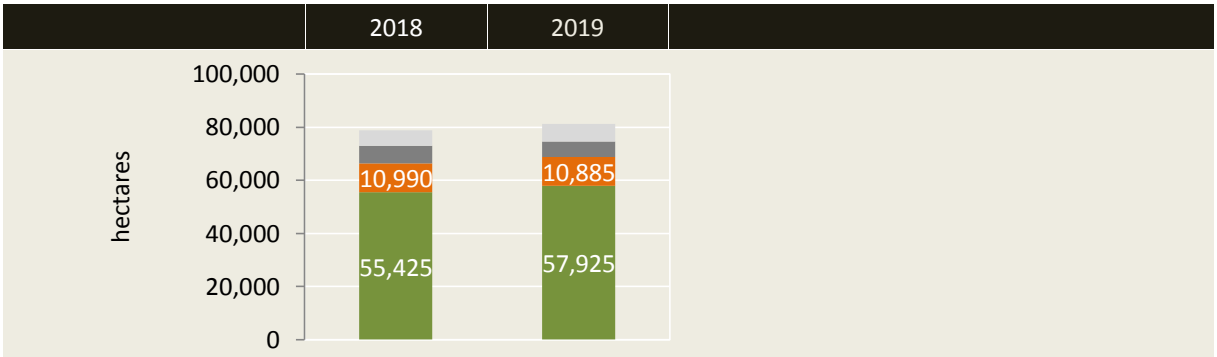
Figure 2 summarises planting trends across the Vic. Murray-Mallee from 2018 to 2019.

Changes in the area of permanent plantings, seasonal crops and vacant (not irrigated) areas from 2018 to 2019 were as follows:

- Permanent plantings increased by 2,500 ha, a 5% increase from 55,425 ha to 57,925 ha. The increase in permanent plantings was mainly in the Wemen river reach (980 ha), Nyah reach (505 ha) and Colignan to Koorlong reach (375 ha).
- Seasonal crops decreased by 105 ha, a 1% decrease from 10,990 ha to 10,885 ha.
- Vacant, previously irrigated permanent plantings, decreased by 600 ha, a 9% decrease from 6,475 ha to 5,875 ha. 405 ha of the decrease were in the private diverter river reaches and 195 ha in the irrigation districts.
- Vacant, previously irrigated seasonal cropping, increased by 675 ha, an 11% increase from 5,885 ha to 6,560 ha.

In 2019, the proportion of permanent plantings, seasonal cropping and vacant areas in the private diverter river reaches and the irrigation districts was as follows:

- 80% of permanent plantings were in private diverter areas, 20% in the irrigation districts;
- 88% of seasonal crops were in private diverter areas, 12% in the irrigation districts;
- 43% of vacant, previously permanent plantings, were in private diverter areas, 57% in the irrigation districts; and
- 88% of vacant, previously seasonal crops, were in private diverter areas, 12% in the irrigation districts.



	2018	2019	% of 2019 total	Change (ha) 2018 to 2019	% Change 2018 to 2019
Permanent - irrigated	55,425	57,925	71%	+2,500	+5%
Seasonal - irrigated	10,990	10,885	14%	-105	-1%
Vacant - permanent	6,475	5,875	7%	-600	-9%
Vacant - seasonal	5,885	6,560	8%	+675	+11%
Total hectares	78,775	81,245	100%	+2,470	+3%
% Permanent	70%	71%			
% Seasonal	14%	14%			
% Vacant	16%	15%			

Figure 2: Vic. Murray-Mallee - planting trends from 2018 to 2019

1.3 Vic. Murray-Mallee - irrigation development

From mid-2018 to mid-2019, the irrigable area in the Vic. Murray-Mallee increased by 2,470 ha, a 3% increase from 78,775 ha to 81,245 ha. This rate of expansion, 2,470 ha/year, is on a par with the average expansion rate from 2003 to 2006 of 2,562 ha/year, which is the second highest growth rate since 1997 (Table 4). The highest growth rate was from 2006 to 2009, with an average of 4,322 ha/year.

Table 4: Vic. Murray-Mallee – average rate of expansion from 1997 to 2019

Average rate of expansion	1997 to 2003	2003 to 2006	2006 to 2009	2009 to 2012	2012 to 2015	2015 to 2018	2018 to 2019
Irrigable area (ha/year)	+1,728	+2,562	+4,322	+825	+247	+1,600	+2,470
Permanent plantings (ha/year)	+1,350	+2,028	+3,098	-192	+77	+1,448	+2,500

Table 5 summarises irrigation development with respect to new development (expansion) and areas retired from irrigation in each of the irrigation districts and private diverter river reaches from 2018 to 2019.

The net increase in the irrigable area of 2,470 ha was the balance of 2,515 ha expansion and 45 ha retired from irrigation.

Across the pumped districts, the irrigable area increased by 10 ha, a less than 1% increase from 17,265 ha in 2018 to 17,275 ha in 2019. The net increase was the balance of 35 ha expansion and 25 ha retired from irrigation.

In the private diverter areas, the irrigable area increased by 2,460 ha, a 4% increase from 61,510 ha in 2018 to 63,970 ha in 2019. The net increase of 2,460 ha was the balance of 2,480 ha expansion and 20 ha retired from irrigation.

Table 5: Vic. Murray-Mallee - irrigation development from 2018 to 2019

	Study area	2018 (ha)	2018 to 2019		2019 (ha)	Change (ha) 2018-2019	Growth % 2018-2019
			Retired	New			
Pumped irrigation districts	Nyah	1,570	0	+20	1,590	+20	+1%
	Robinvale	2,420	0	0	2,420	0	0%
	Red Cliffs	4,440	-5	0	4,435	-5	-<1%
	Mildura	5,830	-15	+15	5,830	0	0%
	Merbein	3,005	-5	0	3,000	-5	-<1%
	Sub-total	17,265	-25	+35	17,275	+10	-<1%
Private diverters	Nyah	9,945	-5	+470	10,410	+465	+5%
	Boundary Bend	21,915	-10	+660	22,565	+650	+3%
	Wemen	12,700	0	+895	13,595	+895	+7%
	Colignan	11,825	0	+270	12,095	+270	+2%
	Mildura	1,970	-5	+55	2,020	+50	+3%
	Lock10 to SA	3,155	0	+130	3,285	+130	+4%
	Sub-total	61,510	-20	+2,480	63,970	+2,460	+4%
Vic. Murray-Mallee total		78,775	-45	+2,515	81,245	+2,470	+3%

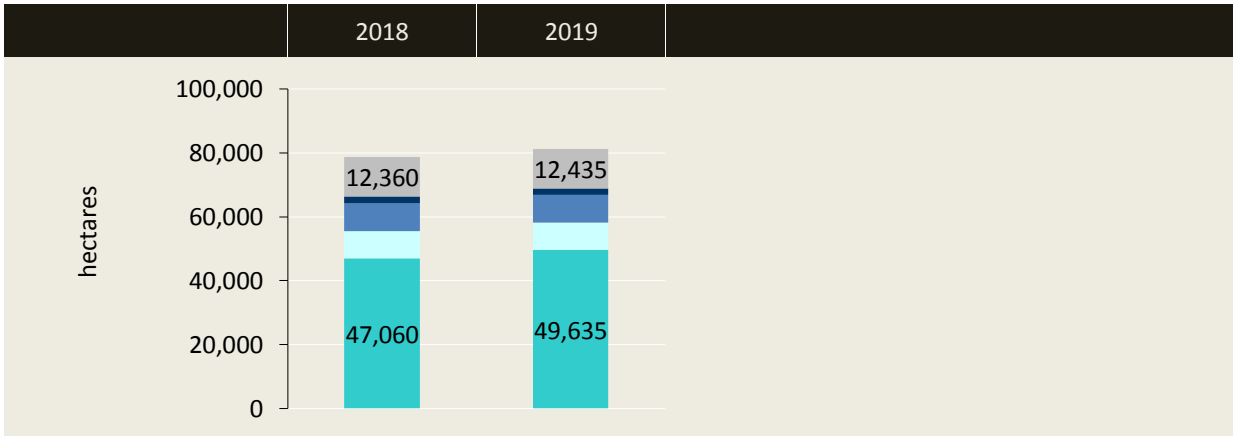
1.4 Vic. Murray-Mallee - irrigation methods

Figure 3 summarises the change in irrigation methods across the Vic. Murray-Mallee from 2018 to 2019.

Drippers remained the dominant irrigation method in 2018 and 2019 in each of the eleven study areas, except for the Robinvale district where lowlevel sprinklers were dominant in 2018 and 2019.

From 2018 to 2019:

- Drip irrigation increased by 2,575 ha; a 5% increase from 47,060 ha to 49,635 ha;
- Lowlevel irrigation increased by 85 ha; a 1% increase from 8,495 ha to 8,580 ha;
- Overhead irrigation increased by 5 ha; a less than 1% increase from 8,600 ha to 8,605 ha; and
- Furrow/flood irrigation decreased by 270 ha, a 12% decrease from 2,260 ha to 1,990 ha.



Irrigation method	2018	2019	% of 2019 total	Change (ha) 2018 to 2019	% Change 2018 to 2019
Drip	47,060	49,635	61%	+2,575	+5%
Low level	8,495	8,580	11%	+85	+1%
Overhead	8,600	8,605	11%	+5	+<1%
Furrow, flood	2,260	1,990	2%	-270	-12%
Vacant	12,360	12,435	15%	+75	+1%
Total hectares	78,775	81,245	100%	+2,470	+3%

Figure 3: Vic. Murray-Mallee - irrigation methods from 2018 to 2019

1.5 Vic. Murray-Mallee - salinity impact zones

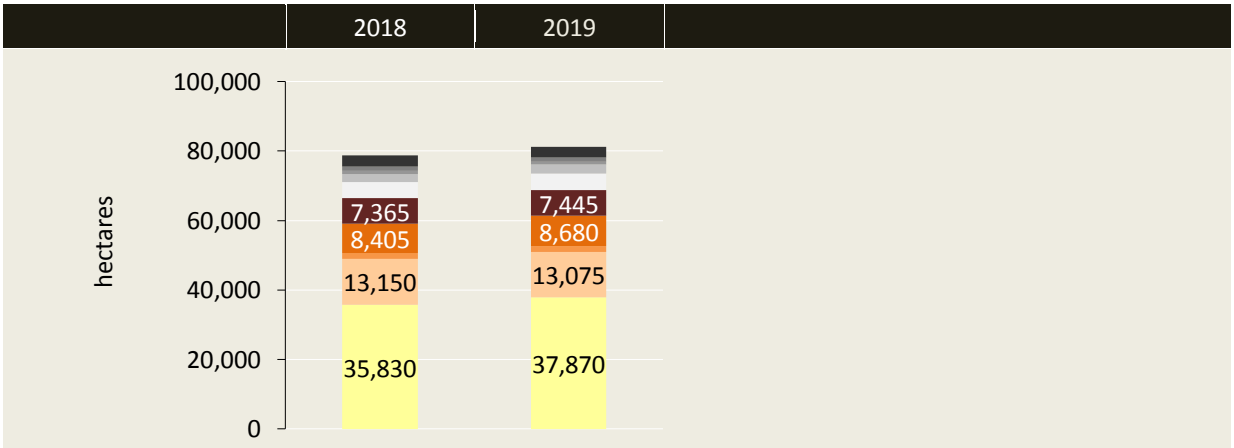
Figure 4 summarises the irrigable area in each salinity impact zone across the Vic. Murray-Mallee from 2018 to 2019.

From 2018 to 2019, the area irrigated in:

- L1 increased by 2,040 ha, a 6% increase from 35,830 ha to 37,870 ha.
- L2 to L4 increased by 275 ha, a 1% increase from 23,220 ha to 23,495 ha.
- HIZ increased by 80 ha, a 1% increase from 7,365 ha to 7,445 ha.

From 2018 to 2019, the irrigable area in:

- L1 increased by 2,070 ha, a 5% increase from 40,475 ha to 42,545 ha.
- L2 to L4 increased by 425 ha, a 2% increase from 27,710 ha to 28,135 ha.
- HIZ decreased by 25 ha, a less than 1% decrease from 10,590 ha to 10,565 ha. The net decrease of 25 ha was the balance of 30 ha retired from irrigation and 5 ha of new HIZ areas (expansion on existing irrigation properties). Areas retired from HIZ were mainly in the Mildura district (15 ha), Red Cliffs district (5 ha) and Mildura river reach (5 ha).



Salinity impact zone		2018	2019	% of 2019 total	Change (ha) 2018 to 2019	% Change 2018 to 2019
Irrigated	L1	35,830	37,870	47%	+2,040	+6%
	L2	13,150	13,075	16%	-75	-1%
	L3	1,665	1,740	2%	+75	+5%
	L4	8,405	8,680	11%	+275	+3%
	HIZ	7,365	7,445	9%	+80	+1%
Not Irrigated	L1	4,645	4,675	6%	+30	+1%
	L2	2,350	2,630	3%	+280	+12%
	L3	815	815	1%	0	0%
	L4	1,325	1,195	1%	-130	-10%
	HIZ	3,225	3,120	4%	-105	-3%
Total (ha)		78,775	81,245	100%	+2,470	+3%

Figure 4: Vic. Murray-Mallee - change in salinity zones from 2018 to 2019

2. Pumped irrigation districts

2.1 Pumped irrigation districts summary

In summary for the pumped irrigation districts; Nyah, Robinvale, Red Cliffs, Mildura and Merbein

Change in crop types from 2018 to 2019

Table grape plantings remained the dominant crop type across the irrigation districts from 2018 to 2019.

The main changes in crop types from 2018 to 2019 were:

1. Table grape plantings increased by 325 ha, a 6% increase from 5,590 ha to 5,915 ha. The net increase of 325 ha was the balance of approximately 200 ha removed (likely being redeveloped) and 525 ha of new or redeveloped plantings. New or redeveloped plantings were in the Mildura irrigation district (230 ha), Red Cliffs district (145 ha), Merbein district (100 ha) and Robinvale district (50 ha). The area recorded for redeveloped plantings in the Robinvale district was conservative as imagery used was of poor resolution.
2. Dried grape plantings decreased by 130 ha, a 7% decrease from 1,845 ha to 1,715 ha. The net decrease of 130 ha was the balance of 225 ha removed and 95 ha of new or redeveloped plantings. New or redeveloped plantings were in the Mildura district (35 ha), Red Cliffs district (35 ha) and Merbein district (25 ha).
3. Field crops (pasture, lucerne and irrigated cereal crops) increased by 35 ha, a 6% increase from 570 ha to 605 ha.
4. Pistachio and walnut plantings increased by 25 ha, a 17% increase from 150 ha to 175 ha. New plantings were in the Merbein (15 ha) and Red Cliffs (10 ha) irrigation districts.
5. Wine grape plantings decreased by 10 ha, a less than 1% decrease from 2,900 ha to 2,890 ha. The net decrease of 10 ha was the balance of approximately 90 ha removed and 80 ha of new or redeveloped plantings. New or redeveloped plantings were in the Red Cliffs district (30 ha), Mildura district (25 ha), Nyah district (20 ha) and Merbein district (5 ha).

Planting trends - permanent plantings, seasonal crops and vacant areas

Changes in the area of permanent plantings, seasonal crops and vacant (not irrigated) areas from 2018 to 2019 were as follows:

- Permanent plantings increased by 215 ha; a 2% increase from 11,600 ha to 11,815 ha. The increase in permanent plantings was in the Red Cliffs district (110 ha), Mildura district (100 ha) and Merbein district (15 ha). Permanent plantings in the Robinvale and Nyah districts decreased by 10 ha.
- Seasonal crops increased by 40 ha; a 3% increase from 1,290 ha to 1,330 ha. Increases in seasonal cropping mainly occurred in the Nyah and Merbein districts.
- Vacant areas, previously permanent plantings, decreased by 195 ha; a 6% decrease from 3,535 ha to 3,340 ha. The decrease mainly occurred in the Red Cliffs district.
- Vacant areas, previously seasonal crops, decreased by 50 ha; a 6% decrease from 840 ha to 790 ha. The decrease mainly occurred in the Mildura and Nyah districts.

In summary for the pumped irrigation districts; Nyah, Robinvale, Red Cliffs, Mildura and Merbein

Irrigation development - new and retired areas

The irrigable area across the pumped irrigation districts increased by 10 ha, a less than 1% increase from 17,265 ha in 2018 to 17,275 ha in 2019.

The net increase of 10 ha was the balance of 35 ha of expansion and 25 ha retired from irrigation, predominantly for urban development.

Expansion occurred in the Nyah district (20 ha) and the Mildura district (15 ha), while areas retired were in the Mildura district (15 ha), Red Cliffs district (5 ha) and Merbein district (5 ha).

Irrigation methods 2018 to 2019

Drippers remained the dominant irrigation method from 2018 to 2019 in each of the five irrigation districts, except for the Robinvale district where lowlevel sprinklers were dominant in 2018 and 2019.

From 2018 to 2019:

- Drip irrigation increased by 305 ha; a 4% increase from 7,145 ha to 7,450 ha.
- Lowlevel irrigation increased by 55 ha; a 1% increase from 3,840 ha to 3,895 ha.
- Overhead irrigation decreased by 45 ha; a 3% decrease from 1,415 ha to 1,370 ha.
- Furrow irrigation decreased by 60 ha; a 12% decrease from 490 ha to 430 ha.

Salinity impact zones 2018 to 2019

The irrigable area across the irrigation districts was predominantly in the high river salinity impact zone, HIZ, in 2018 and 2019.

From 2018 to 2019, the irrigable area in:

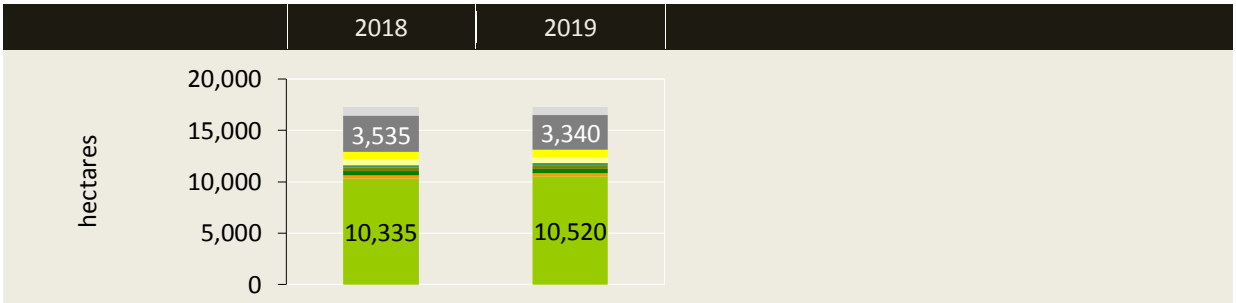
- L1 increased by 25 ha, a less than 1% increase from 5,955 ha to 5,980 ha.
- L2 to L4 increased by 5 ha, a less than 1% increase from 3,695 ha to 3,700 ha.
- HIZ decreased by 20 ha, a less than 1% decrease from 7,615 ha to 7,595 ha. The decrease was areas retired from irrigation.

The total area retired from irrigation between 2018 and 2019 was 25 ha; 20 ha of HIZ areas and 5 ha of L1, L2 and L4 areas.

2.1.1 Pumped districts summary - crop types from 2018 to 2019

Figure 5 summarises the change in crop types across the pumped irrigation districts from 2018 to 2019. Table grape plantings were the dominant crop in 2018 and 2019. The main changes from 2018 to 2019 were:

1. Table grape plantings increased by 325 ha, a 6% increase from 5,590 ha to 5,915 ha. The net increase of 325 ha was the balance of approximately 200 ha removed (likely being redeveloped) and 525 ha of new or redeveloped plantings. New or redeveloped plantings were in the Mildura irrigation district (230 ha), Red Cliffs district (145 ha), Merbein district (100 ha) and Robinvale district (50 ha). Figures for Robinvale are conservative as imagery used was of poor resolution.
2. Dried grape plantings decreased by 130 ha, a 7% decrease from 1,845 ha to 1,715 ha. The net decrease of 130 ha was the balance of 225 ha removed and 95 ha of new or redeveloped plantings. New or redeveloped plantings were in the Mildura district (35 ha), Red Cliffs district (35 ha) and Merbein district (25 ha).
3. Field crops (e.g. pasture and lucerne) increased by 35 ha, a 6% increase from 570 ha to 605 ha.
4. Pistachio and walnut plantings increased by 25 ha, a 17% increase from 150 ha to 175 ha. New plantings were in the Merbein (15 ha) and Red Cliffs (10 ha) irrigation districts.
5. Wine grape plantings decreased by 10 ha, a less than 1% decrease from 2,900 ha to 2,890 ha. The net decrease of 10 ha was the balance of approximately 90 ha removed and 80 ha of new or redeveloped plantings. New or redeveloped plantings were in the Red Cliffs district (30 ha), Mildura district (25 ha), Nyah district (20 ha) and Merbein district (5 ha).



	Crop type	2018 ha	2019 ha	% of 2019 total	Change (ha) 2018 to 2019	% Change 2018 to 2019
Permanent	Grape Dried	1,845	1,715	10%	-130	-8%
	Grape Table	5,590	5,915	34%	+325	+6%
	Grape Wine	2,900	2,890	17%	-10	-<1%
	Citrus	285	305	2%	+20	+7%
	Fruit Olive	105	100	1%	-5	-5%
	Fruit Other	335	325	2%	-10	-3%
	Nut Almond	190	195	1%	+5	+3%
	Nut Other	150	175	1%	+25	+17%
	Other	200	195	1%	-5	-3%
Seasonal	Field Crop	570	605	4%	+35	+6%
	Veg. Carrot	50	70	<1%	+20	+40%
	Veg. Potato	-	-	-	-	-
	Veg. Other	670	655	4%	-15	-2%
	Vacant P	3,535	3,340	19%	-195	-6%
	Vacant S	840	790	5%	-50	-6%
Total		17,265	17,275	100%	+10	+<1%

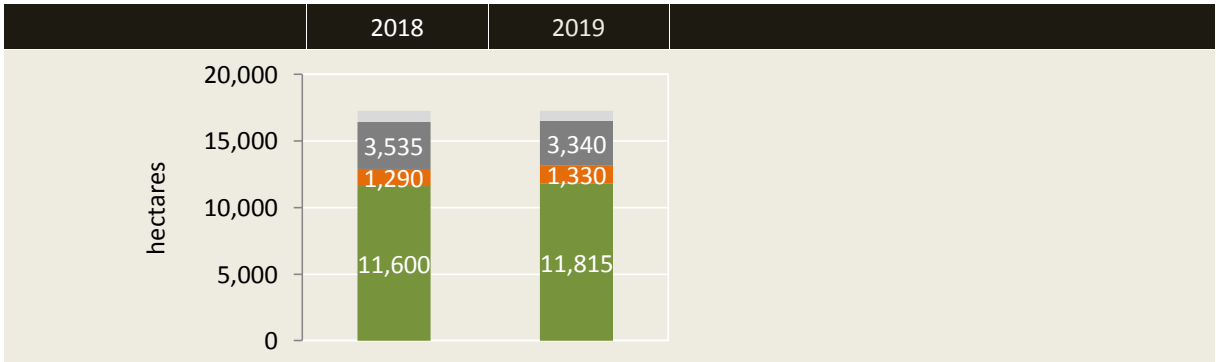
Figure 5: Pumped irrigation districts – change in crop types from 2018 to 2019

2.1.2 Pumped irrigation districts - planting trends

Figure 6 summarises planting trends across the irrigation districts from 2018 to 2019.

From 2018 to 2019:

- Permanent plantings increased by 215 ha; a 2% increase from 11,600 ha to 11,815 ha. The increase in permanent plantings was in the Red Cliffs district (110 ha), Mildura district (100 ha) and Merbein district (15 ha). Permanent plantings in the Robinvale and Nyah districts decreased by 10 ha.
- Seasonal crops increased by 40 ha; a 3% increase from 1,290 ha to 1,330 ha. Increases in seasonal cropping mainly occurred in the Nyah and Merbein districts.
- Vacant areas, previously permanent plantings, decreased by 195 ha; a 6% decrease from 3,535 ha to 3,340 ha. The decrease mainly occurred in the Red Cliffs district.
- Vacant areas, previously seasonal crops, decreased by 50 ha; a 6% decrease from 840 ha to 790 ha. The decrease mainly occurred in the Mildura and Nyah districts.



	2018	2019	% of 2019 total	Change (ha) 2018 to 2019	% Change 2018 to 2019
Permanent - irrigated	11,600	11,815	68%	+215	+2%
Seasonal - irrigated	1,290	1,330	8%	+40	+3%
Vacant - permanent	3,535	3,340	19%	-195	-6%
Vacant - seasonal	840	790	5%	-50	-6%
Total hectares	17,265	17,275	100%	+10	+<1%
% Permanent	67%	68%			
% Seasonal	7%	8%			
% Vacant	25%	24%			

Figure 6: Pumped irrigation districts - planting trends from 2018 to 2019

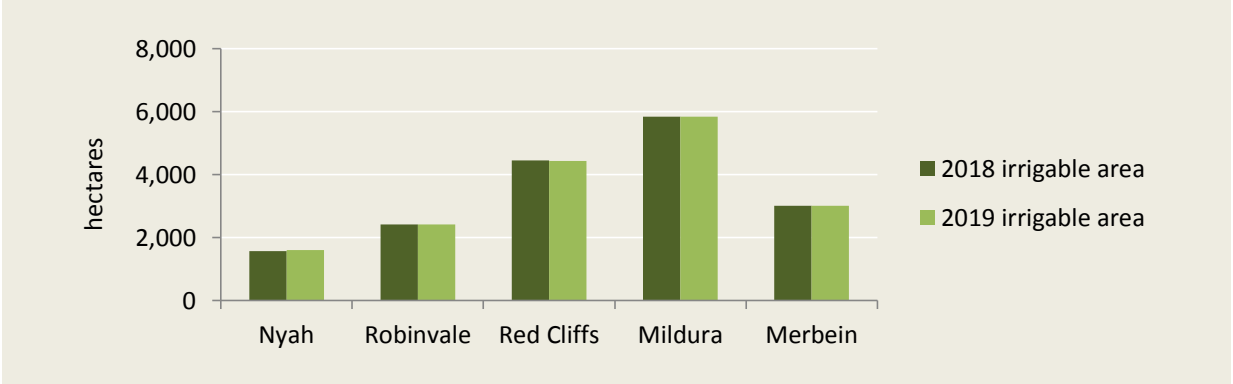
2.1.3 Pumped districts summary - irrigation development

Figure 7 summarises irrigation development with respect to new development (expansion) and areas retired[1] from irrigation across the pumped irrigation districts from 2018 to 2019.

The irrigable area across the irrigation districts increased by 10 ha, a less than 1% increase from 17,265 ha in 2018 to 17,275 ha in 2019.

The net increase of 10 ha was the balance of 35 ha of expansion and 25 ha retired from irrigation, predominantly for urban development.

Expansion occurred in the Nyah district (20 ha) and the Mildura district (15 ha), while areas retired were in the Mildura district (15 ha), Red Cliffs district (5 ha) and Merbein district (5 ha).



Irrigation district	2018 (ha)	2018 to 2019		2019 (ha)	Change 2018-2019	Growth 2018-2019
		Retired	New			
Nyah[2]	1,570	0	+20	1,590	+20	+1%
Robinvale	2,420	0	0	2,420	0	0%
Red Cliffs	4,440	-5	0	4,435	-5	-<1%
Mildura	5,830	-15	+15	5,830	0	0%
Merbein	3,005	-5	0	3,000	-5	-<1%
Total	17,265	-25	+35	17,275	+10	+<1%

Figure 7: Pumped irrigation districts - irrigation development from 2018 to 2019

[1] Retired areas have undergone a change in land use that precludes use for irrigation e.g. urban development, housing, sheds, dams and land set aside for conservation purposes.

[2] Hectares for the Nyah irrigation district include areas outside the district but supplied with water from the district, whereas figures for the other districts are areas inside the district boundary.

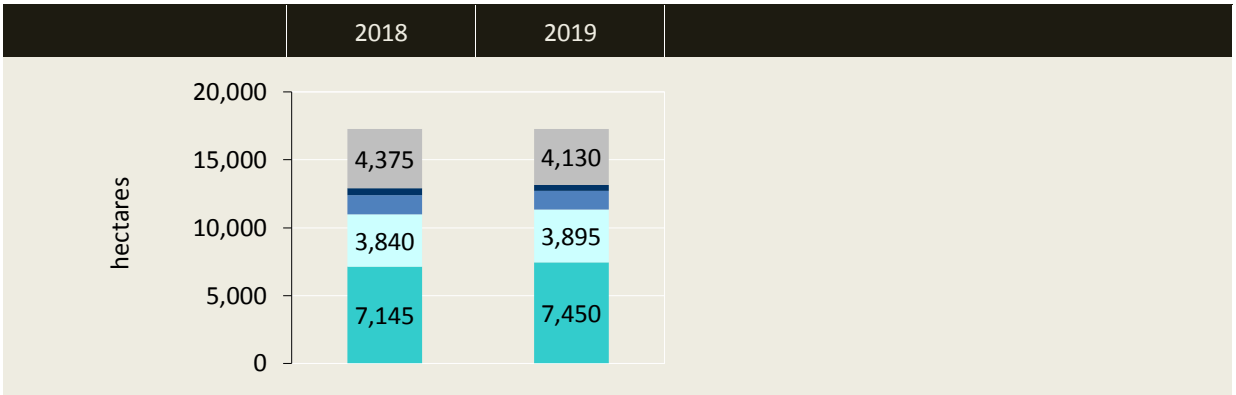
2.1.4 Pumped districts summary - irrigation methods

Figure 8 summarises the change in irrigation methods across the pumped irrigation districts from 2018 to 2019.

Drippers remained the dominant irrigation method from 2018 to 2019 across the irrigation districts. Drippers also remained dominant in each of the five irrigation districts, except for the Robinvale district where lowlevel sprinklers were dominant in 2018 and 2019.

From 2018 to 2019:

- Drip irrigation increased by 305 ha; a 4% increase from 7,145 ha to 7,450 ha.
- Lowlevel irrigation increased by 55 ha; a 1% increase from 3,840 ha to 3,895 ha.
- Overhead irrigation decreased by 45 ha; a 3% decrease from 1,415 ha to 1,370 ha.
- Furrow irrigation decreased by 60 ha; a 12% decrease from 490 ha to 430 ha.



Irrigation method	2018	2019	% of 2019 total	Change (ha) 2018 to 2019	% Change 2018 to 2019
Drip	7,145	7,450	43%	+305	+4%
Low level	3,840	3,895	23%	+55	+1%
Overhead	1,415	1,370	8%	-45	-3%
Furrow, flood	490	430	2%	-60	-12%
Vacant	4,375	4,130	24%	-245	-6%
Total hectares	17,265	17,275	100%	+10	+<1%

Figure 8: Pumped irrigation districts - irrigation methods from 2018 to 2019

2.1.5 Pumped districts summary - salinity impact zones

Figure 9 summarises the irrigable area in each salinity impact zone across the five pumped irrigation districts from 2018 to 2019.

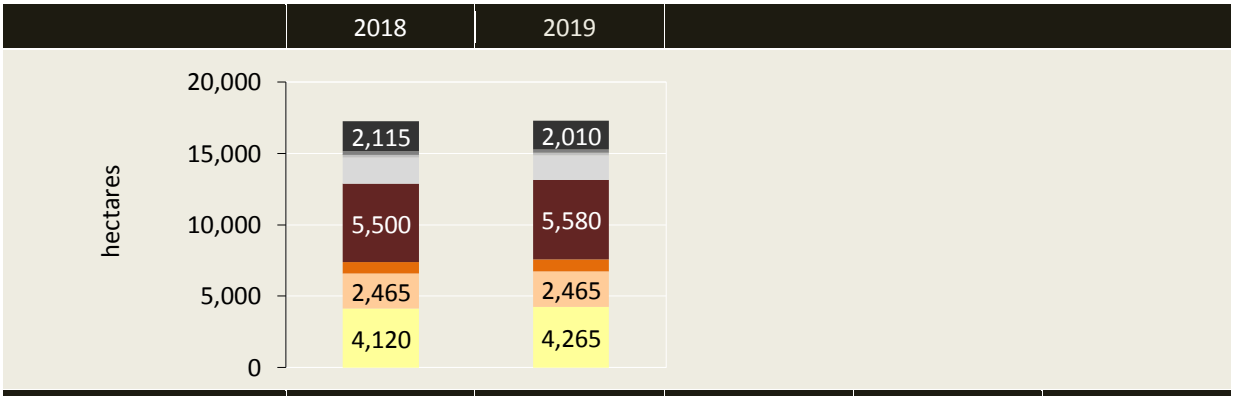
From 2018 to 2019, the area irrigated in:

- L1 increased by 145 ha, a 4% increase from 4,120 ha to 4,265 ha.
- L2 to L4 increased by 30 ha, a 1% increase from 3,270 ha to 3,300 ha.
- HIZ increased by 80 ha, a 1% increase from 5,500 ha to 5,580 ha.

From 2018 to 2019, the irrigable area in:

- L1 increased by 25 ha, a less than 1% increase from 5,955 ha to 5,980 ha.
- L2 to L4 increased by 5 ha, a less than 1% increase from 3,695 ha to 3,700 ha.
- HIZ decreased by 20 ha, a less than 1% decrease from 7,615 ha to 7,595 ha. The decrease was areas retired from irrigation.

The area retired from irrigation between 2018 and 2019 was 25 ha; 20 ha of HIZ areas and 5 ha of L1, L2 and L4 areas.



Salinity impact zone		2018	2019	% of 2019 total	Change (ha) 2018 to 2019	% Change 2018 to 2019
Irrigated	L1	4,120	4,265	25%	+145	+4%
	L2	2,465	2,465	14%	0	0%
	L3	15	15	<1%	0	0%
	L4	790	820	5%	+30	+4%
	HIZ	5,500	5,580	32%	+80	+1%
Not Irrigated	L1	1,835	1,715	10%	-120	-7%
	L2	160	165	1%	+5	+3%
	L3	10	10	<1%	0	0%
	L4	255	225	1%	-30	-12%
	HIZ	2,115	2,015	12%	-100	-5%
Total (ha)		17,265	17,275	100%	+10	+<1%

Figure 9: Pumped irrigation districts - irrigable area in each salinity impact zone from 2018 to 2019

2.2 Nyah irrigation district

In summary for the Nyah irrigation district

Change in crop types from 2018 to 2019

Wine grape plantings were the dominant crop in 2018 and 2019.

The main changes in crop types from 2018 to 2019 were:

1. Wine grape plantings increased by 20 ha; a 4% increase from 475 ha to 495 ha. The increase was mostly due to plantings in new areas (expansion).
2. Dried grape plantings declined by 20 ha; a 21% decrease from 95 ha to 75 ha.
3. Seasonal cropping increased by 30 ha, 15 ha of vegetables and 15 ha field crops such as pasture and lucerne.

Planting trends - permanent plantings, seasonal crops and vacant areas

From 2018 to 2019:

- Permanent plantings decreased by 5 ha; a 1% decrease from 675 ha to 670 ha.
- Seasonal crops increased by 30 ha; a 13% increase from 235 ha to 265 ha.
- Vacant areas, previously permanent plantings, increased by 10 ha; a 4% increase from 260 ha to 270 ha.
- Vacant areas, previously seasonal crops, decreased by 15 ha; a 4% decrease from 400 ha to 385 ha.

Irrigation development - new and retired areas

The irrigable area in the Nyah irrigation district increased by 20 ha, a 1% increase from 1,570 ha in 2018 to 1,590 ha in 2019. The increase of 20 ha was mainly new plantings of wine grapes.

Irrigation methods 2018 to 2019

Drip irrigation remained the dominant irrigation method in the Nyah irrigation district in 2018 and 2019.

From 2018 to 2019:

- Drip irrigation increased by 25 ha, a 4% increase from 640 ha to 665 ha;
- Lowlevel irrigation increased by 5 ha, a 3% increase from 160 ha to 165 ha;
- Overhead irrigation increased by 5 ha, a 13% increase from 40 ha to 45 ha; and
- Furrow irrigation decreased by 10 ha, a 14% decrease from 70 ha to 60 ha.

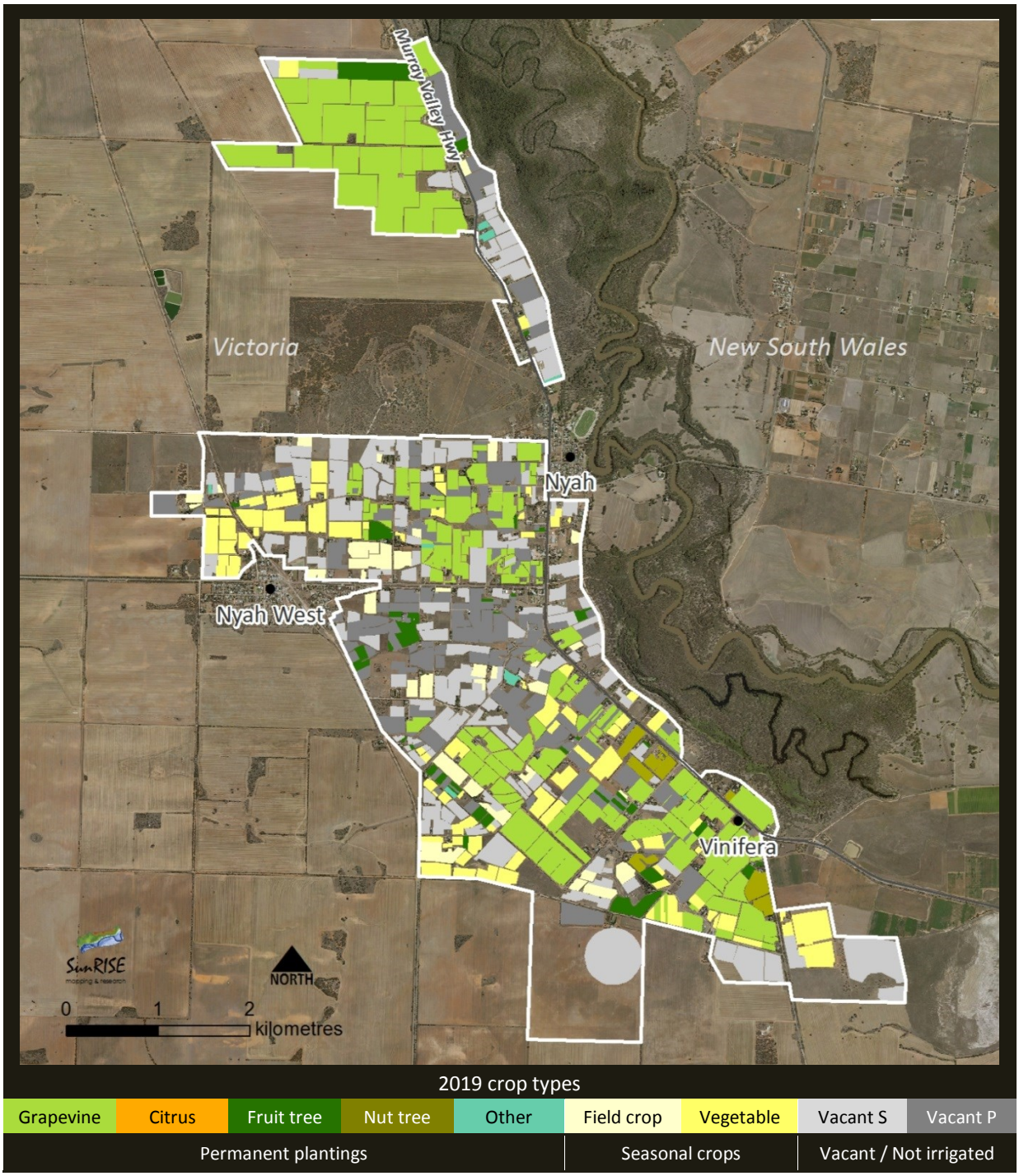
Salinity impact zones 2018 to 2019

From 2018 to 2019 the irrigable area in:

- L1 increased by 15 ha, a 1% increase from 1,340 ha to 1,355 ha.
- L2 increased by 5 ha, a 2% increase from 230 ha to 235 ha.

2.2.1 Nyah irrigation district - crop types in 2019

Map 2 shows the Nyah irrigation district with crop types in 2019.



Map 2: Nyah irrigation district showing 2019 crop types

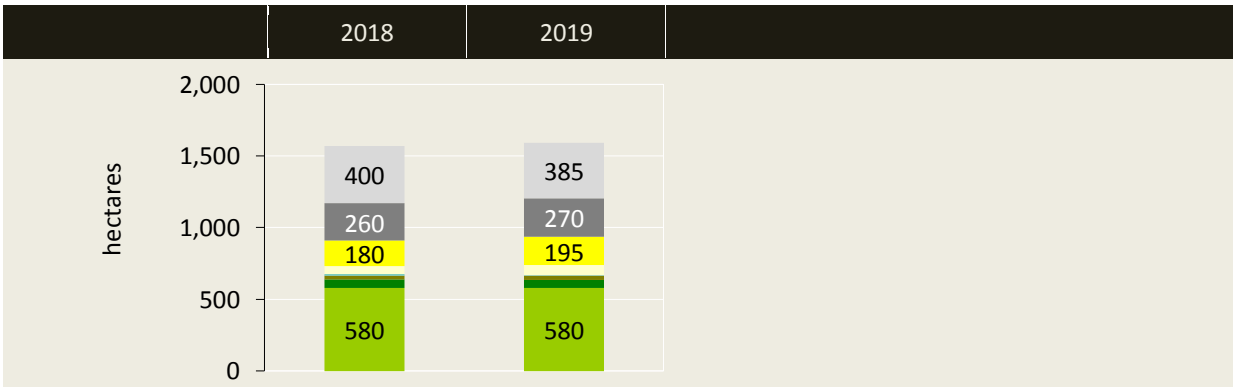
2.2.2 Nyah irrigation district - crop types from 2018 to 2019

Figure 10 summarises the change in irrigated crops in the Nyah irrigation district from 2018 to 2019.

Wine grape plantings were the dominant crop in 2018 and 2019.

The main changes in crop types from 2018 to 2019 were:

1. Wine grape plantings increased by 20 ha; a 4% increase from 475 ha to 495 ha. The increase was mostly due to plantings in new areas (expansion).
2. Dried grape plantings declined by 20 ha; a 21% decrease from 95 ha to 75 ha.
3. Seasonal cropping increased by 30 ha, 15 ha of vegetables and 15 ha field crops such as pasture and lucerne.



Crop type		2018 ha	2019 ha	% of 2019 total	Change (ha) 2018 to 2019	% Change 2018 to 2019
Permanent	Grape Dried	95	75	5%	-20	-21%
	Grape Table	10	10	1%	0	0%
	Grape Wine	475	495	31%	+20	+4%
	Citrus	-	-	-	-	-
	Fruit Olive	10	10	1%	0	0%
	Fruit Other	50	45	3%	-5	-10%
	Nut Almond	5	5	0%	0	0%
	Nut Other	20	25	2%	+5	+25%
	Other	10	5	0%	-5	-50%
Seasonal	Field Crop	55	70	4%	+15	+27%
	Veg. Carrot	50	70	4%	+20	+40%
	Veg. Potato	-	-	-	-	-
	Veg. Other	130	125	8%	-5	-4%
	Vacant P	260	270	17%	+10	+4%
	Vacant S	400	385	24%	-15	-4%
Total		1,570	1,590	100%	+20	+1%

Figure 10: Nyah irrigation district – change in crop types from 2018 to 2019

2.2.3 Nyah irrigation district - planting trends

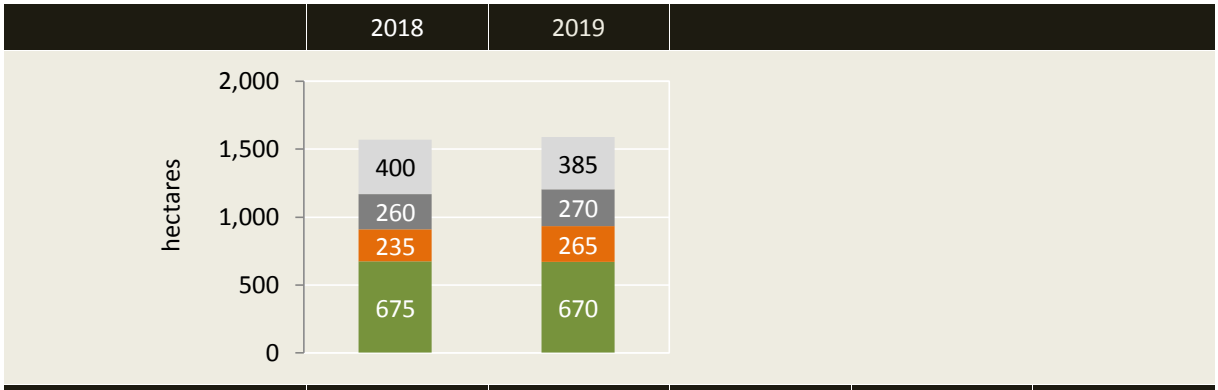
Figure 11 summarises planting trends in the Nyah irrigation district from 2018 to 2019.

The proportion of permanent plantings, seasonal cropping and vacant areas changed from:

- 43% permanent, 15% seasonal and 42% vacant in 2018; to
- 42% permanent, 17% seasonal and 41% vacant in 2019.

From 2018 to 2019:

- Permanent plantings decreased by 5 ha; a 1% decrease from 675 ha to 670 ha.
- Seasonal crops increased by 30 ha; a 13% increase from 235 ha to 265 ha.
- Vacant areas, previously permanent plantings, increased by 10 ha; a 4% increase from 260 ha to 270 ha.
- Vacant areas, previously seasonal crops, decreased by 15 ha; a 4% decrease from 400 ha to 385 ha.



	2018	2019	% of 2019 total	Change (ha) 2018 to 2019	% Change 2018 to 2019
Permanent - irrigated	675	670	42%	-5	-1%
Seasonal - irrigated	235	265	17%	+30	+13%
Vacant - permanent	260	270	17%	+10	+4%
Vacant - seasonal	400	385	24%	-15	-4%
Total hectares	1,570	1,590	100%	+20	+1%
% Permanent	43%	42%			
% Seasonal	15%	17%			
% Vacant	42%	41%			

Figure 11: Nyah irrigation district - planting trends from 2018 to 2019

2.2.4 Nyah irrigation district - irrigation development

Map 3 shows irrigation development from 2018 to 2019 in the Nyah irrigation district with respect to new development (expansion) and areas retired[3] from irrigation.

- The irrigable area increased by 20 ha, a 1% increase from 1,570 ha in 2018 to 1,590 ha in 2019.
- Areas retired totalled less than 2.5 ha (i.e. 0 ha when rounded to the nearest 5 ha).

	Hectares		% Change
Irrigation areas in 2018 (2017-18 season)	1,570		
Retired between 2018 and 2019	0		0%
Expansion between 2018 and 2019	+20		+1%
Irrigation areas in 2019 (2018-19 season)	1,590		

Map 3: Nyah irrigation district - irrigation development from 2018 to 2019

[3] Retired areas have undergone a change in land use that precludes use for irrigation e.g. urban development, housing, sheds, dams and land set aside for conservation purposes.

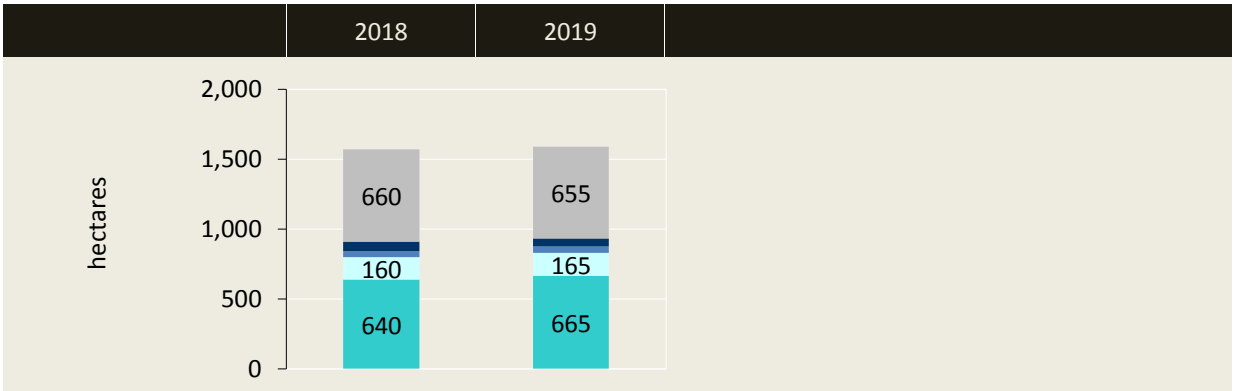
2.2.5 Nyah irrigation district - irrigation methods

Figure 12 summarises the change in irrigation methods in the Nyah irrigation district from 2018 to 2019.

Drippers remained the dominant irrigation method from 2018 to 2019.

From 2018 to 2019:

- Drip irrigation increased by 25 ha, a 4% increase from 640 ha to 665 ha;
- Lowlevel irrigation increased by 5 ha, a 3% increase from 160 ha to 165 ha;
- Overhead irrigation increased by 5 ha, a 13% increase from 40 ha to 45 ha; and
- Furrow irrigation decreased by 10 ha, a 14% decrease from 70 ha to 60 ha.



Irrigation method	2018	2019	% of 2019 total	Change (ha) 2018 to 2019	% Change 2018 to 2019
Drip	640	665	42%	+25	+4%
Low level	160	165	10%	+5	+3%
Overhead	40	45	3%	+5	+13%
Furrow, flood	70	60	4%	-10	-14%
Vacant	660	655	41%	-5	-1%
Total hectares	1,570	1,590	100%	+20	+1%

Figure 12: Nyah irrigation district - irrigation methods from 2018 to 2019

2.2.6 Nyah irrigation district - salinity impact zones

Figure 13 summarises the irrigable area in each salinity impact zone in the Nyah irrigation district from 2018 to 2019.

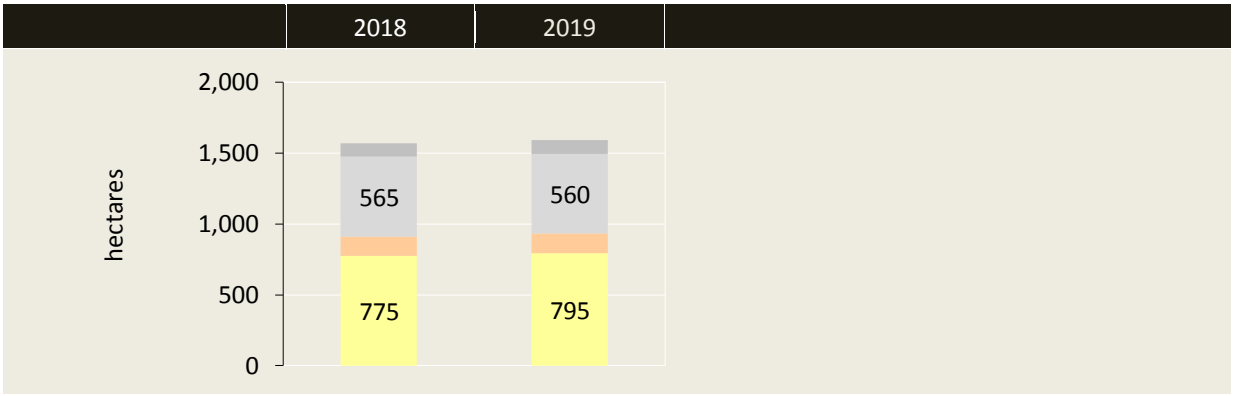
The Nyah district is in low salinity impact zones L1 and L2. No irrigable areas are in the high salinity impact zone.

From 2018 to 2019, the area irrigated in:

- L1 increased by 20 ha, a 3% increase from 775 ha to 795 ha.
- L2 increased by 5 ha, a 4% increase from 135 ha to 140 ha.

From 2018 to 2019, the irrigable area in:

- L1 increased by 15 ha, a 1% increase from 1,340 ha to 1,355 ha.
- L2 increased by 5 ha, a 2% increase from 230 ha to 235 ha.



	Salinity impact zone	2018	2019	% of 2019 total	Change (ha) 2018 to 2019	% Change 2018 to 2019
Irrigated	L1	775	795	50%	+20	+3%
	L2	135	140	9%	+5	+4%
	L3	-	-	-	-	-
	L4	-	-	-	-	-
	HIZ	-	-	-	-	-
Not Irrigated	L1	565	560	35%	-5	-1%
	L2	95	95	6%	0	0%
	L3	-	-	-	-	-
	L4	-	-	-	-	-
	HIZ	-	-	-	-	-
Total (ha)		1,570	1,590	100%	+20	+1%

Figure 13: Nyah irrigation district - irrigable area in each salinity impact zone from 2018 to 2019

2.3 Robinvale irrigation district

In summary for the Robinvale irrigation district

Change in crop types from 2018 to 2019

Table grape plantings remained the dominant crop type in 2018 and 2019.

The main change in crop types from 2018 to 2019 was:

- Table grape plantings increased by 15 ha; a 1% increase from 2,080 ha to 2,095 ha.

Planting trends - permanent plantings, seasonal crops and vacant areas

There was no discernible change in the proportion of permanent plantings, seasonal cropping and vacant areas in the Robinvale irrigation district from 2018 to 2019. It remained at 96% permanent, <1% seasonal and 3% vacant.

Vacant/not irrigated areas in 2018 and 2019 were mainly temporarily vacant while in redevelopment.

From 2018 to 2019:

- Permanent plantings decreased by 5 ha; a less than 1% decrease from 2,335 ha to 2,330 ha.
- Seasonal cropping remained at 10 ha in 2018 and 2019.
- Vacant areas, previously permanent plantings, increased by 5 ha; a 7% increase from 70 ha to 75 ha.
- Vacant areas, previously seasonal crops, remained at 5 ha in 2018 and 2019.

Irrigation development - new and retired areas

The irrigable area in the Robinvale irrigation district remained at 2,420 ha in 2018 and 2019. New or retired areas were negligible, less than 2 ha.

Irrigation methods 2018 to 2019

Lowlevel sprinklers were the dominant irrigation method in the Robinvale district in 2018 and 2019.

From 2018 to 2019:

- Drip irrigation increased by 20 ha, a 2% increase from 855 ha to 875 ha;
- Lowlevel irrigation decreased by 20 ha, a 1% decrease from 1,485 ha to 1,465 ha;
- Overhead irrigation decreased by 5 ha, a 100% decrease from 5 ha to 0 ha; and
- There was no furrow irrigation in 2018 and 2019.

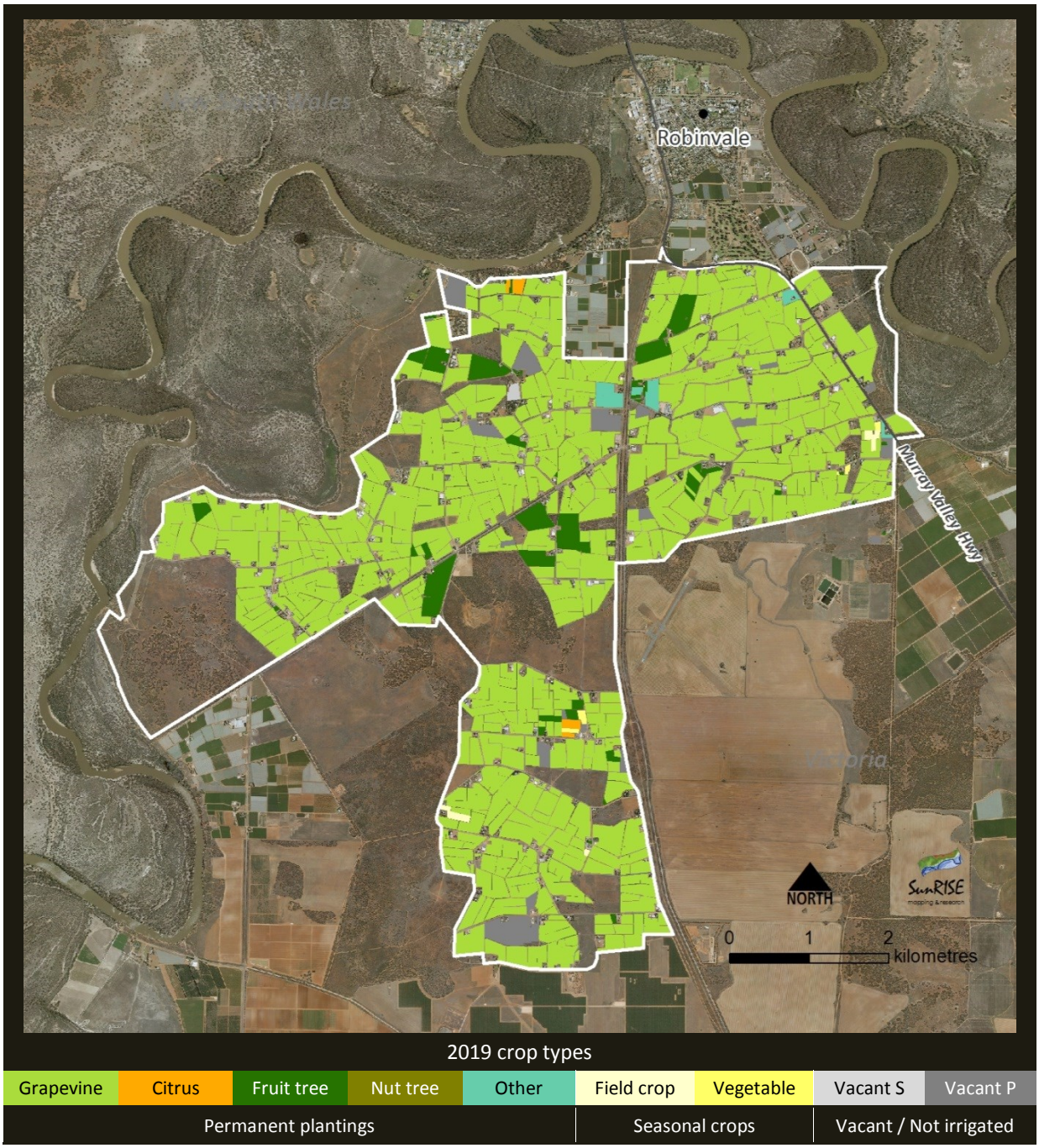
Salinity impact zones 2018 to 2019

The Robinvale irrigation district is in low salinity impact zones L2 and L3. The irrigable area in:

- L2 remained at 2,395 ha in 2018 and 2019.
- L3 remained at 25 ha in 2018 and 2019.

2.3.1 Robinvale irrigation district - crop types in 2019

Map 4 shows the Robinvale irrigation district and crop types in 2019.



Map 4: Robinvale irrigation district showing 2019 crop types

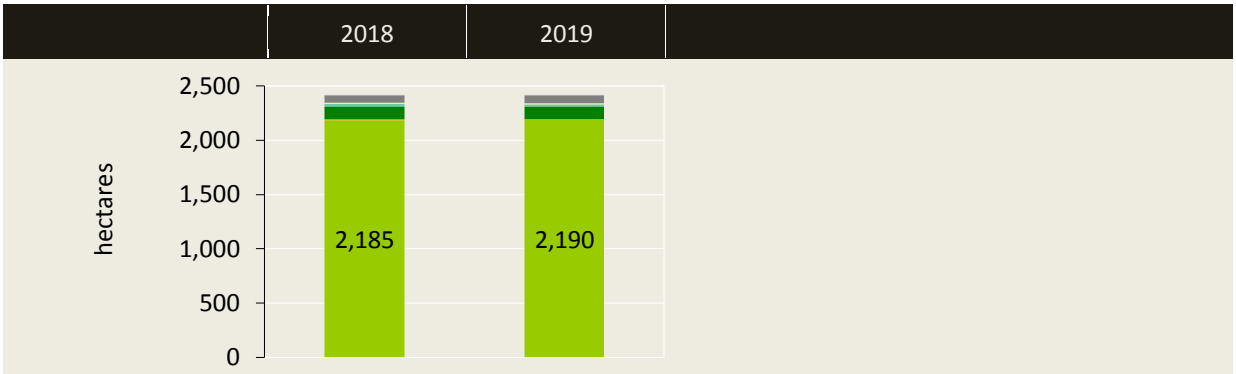
2.3.2 Robinvale irrigation district - crop types from 2018 to 2019

Figure 14 summarises the change in irrigated crops in the Robinvale irrigation district from 2018 to 2019.

Table grape plantings remained the dominant crop type in 2018 and 2019.

The main change in crop types from 2018 to 2019 was:

1. Table grape plantings increased by 15 ha; a 1% increase from 2,080 ha to 2,095 ha.



	Crop type	2018 ha	2019 ha	% of 2019 total	Change (ha) 2018 to 2019	% Change 2018 to 2019
Permanent	Grape Dried	30	25	1%	-5	-17%
	Grape Table	2,080	2,095	87%	+15	+1%
	Grape Wine	75	70	3%	-5	-7%
	Citrus	10	5	0%	-5	-50%
	Fruit Olive	-	-	-	-	-
	Fruit Other	115	115	5%	0	0%
	Nut Almond	-	-	-	-	-
	Nut Other	-	-	-	-	-
	Other	25	20	1%	-5	-20%
Seasonal	Field Crop	5	5	0%	0	0%
	Veg. Carrot	-	-	-	-	-
	Veg. Potato	-	-	-	-	-
	Veg. Other	5	5	0%	0	0%
	Vacant P	70	75	3%	+5	+7%
	Vacant S	5	5	0%	0	0%
Total		2,420	2,420	100%	0	0%

Figure 14: Robinvale irrigation district - crop types from 2018 to 2019

2.3.3 Robinvale irrigation district - planting trends

Figure 15 summarises planting trends in the Robinvale irrigation district from 2018 to 2019.

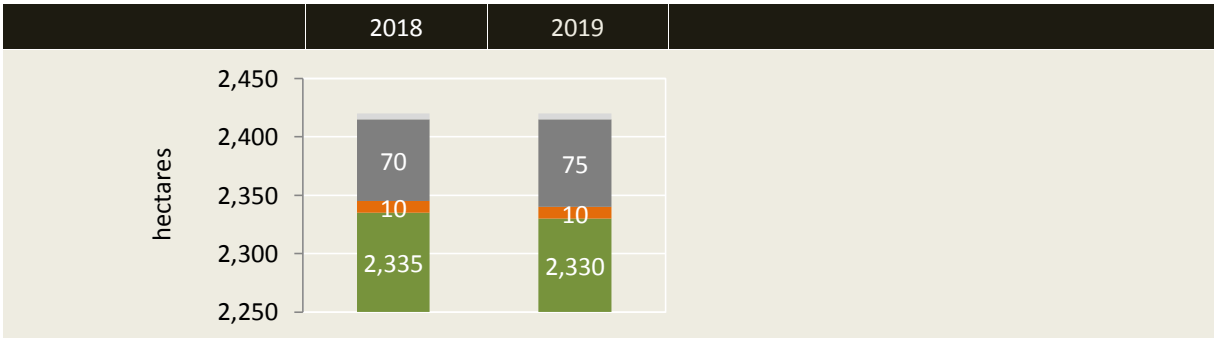
There was no discernible change in the proportion of permanent plantings, seasonal cropping and vacant areas in the Robinvale irrigation district from 2018 to 2019. It remained at:

- 96% permanent, <1% seasonal and 3% vacant.

Areas recorded as vacant/not irrigated in 2018 and 2019 were mainly in redevelopment.

From 2018 to 2019:

- Permanent plantings decreased by 5 ha; a less than 1% decrease from 2,335 ha to 2,330 ha.
- Seasonal cropping remained at 10 ha in 2018 and 2019.
- Vacant areas, previously permanent plantings, increased by 5 ha; a 7% increase from 70 ha to 75 ha.
- Vacant areas, previously seasonal crops, remained at 5 ha in 2018 and 2019.



	2018	2019	% of 2019 total	Change (ha) 2018 to 2019	% Change 2018 to 2019
Permanent - irrigated	2,335	2,330	96%	-5	-<1%
Seasonal - irrigated	10	10	<1%	0	0%
Vacant - permanent	70	75	3%	+5	+7%
Vacant - seasonal	5	5	<1%	0	0%
Total hectares	2,420	2,420	100%	0	0%
% Permanent	96%	96%			
% Seasonal	<1%	<1%			
% Vacant	3%	3%			

Figure 15: Robinvale irrigation district - planting trends from 2018 to 2019

2.3.4 Robinvale irrigation district - irrigation development

Map 5 shows irrigation development from 2018 to 2019 in the Robinvale irrigation district with respect to new development (expansion) and areas retired[4] from irrigation.

- The irrigable area remained at 2,420 ha in 2018 and 2019.
- Areas retired totalled less than 2.5 ha (i.e. 0 ha when rounded to the nearest 5 ha).

	Hectares		% Change
Irrigation areas in 2018 (2017-18 season)	2,420		
Retired between 2018 and 2019	0		0%
Expansion between 2018 and 2019	0		0%
Irrigation areas in 2019 (2018-19 season)	2,420		

Map 5: Robinvale irrigation district - irrigation development from 2018 to 2019

[4] Retired areas have undergone a change in land use that precludes use for irrigation e.g. urban development, housing, sheds, dams and land set aside for conservation purposes.

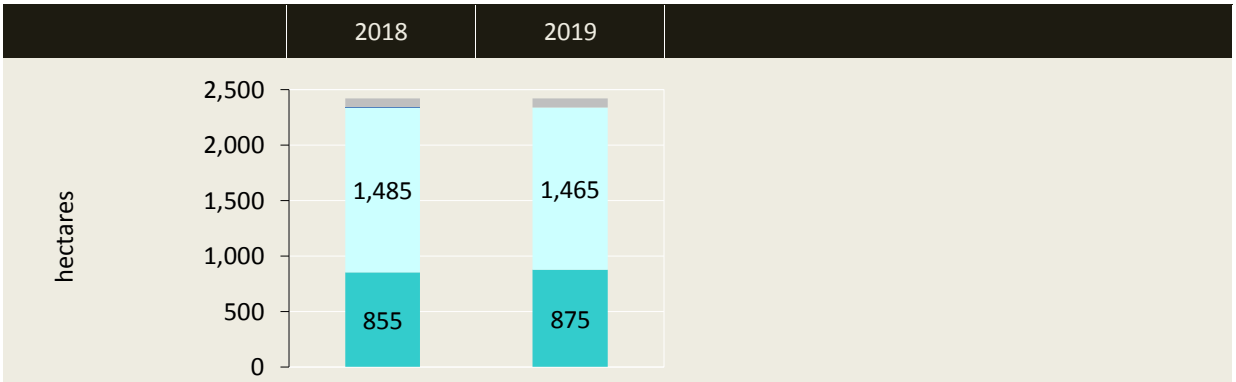
2.3.5 Robinvale irrigation district - irrigation methods

Figure 16 summarises the change in irrigation methods in the Robinvale irrigation district from 2018 to 2019.

Lowlevel sprinklers remained the dominant irrigation method in 2018 and 2019.

From 2018 to 2019:

- Drip irrigation increased by 20 ha, a 2% increase from 855 ha to 875 ha.
- Lowlevel irrigation decreased by 20 ha, a 1% decrease from 1,485 ha to 1,465 ha.
- Overhead irrigation decreased by 5 ha, a 100% decrease from 5 ha to 0 ha.
- There was no furrow irrigation in 2018 and 2019.



Irrigation method	2018	2019	% of 2019 total	Change (ha) 2018 to 2019	% Change 2018 to 2019
Drip	855	875	36%	+20	+2%
Low level	1,485	1,465	61%	-20	-1%
Overhead	5	0	0%	-5	-100%
Furrow, flood	0	0	0%	0	0
Vacant	75	80	3%	+5	+7%
Total hectares	2,420	2,420	100%	0	0%

Figure 16: Robinvale irrigation district - irrigation methods from 2018 to 2019

2.3.6 Robinvale irrigation district - salinity impact zones

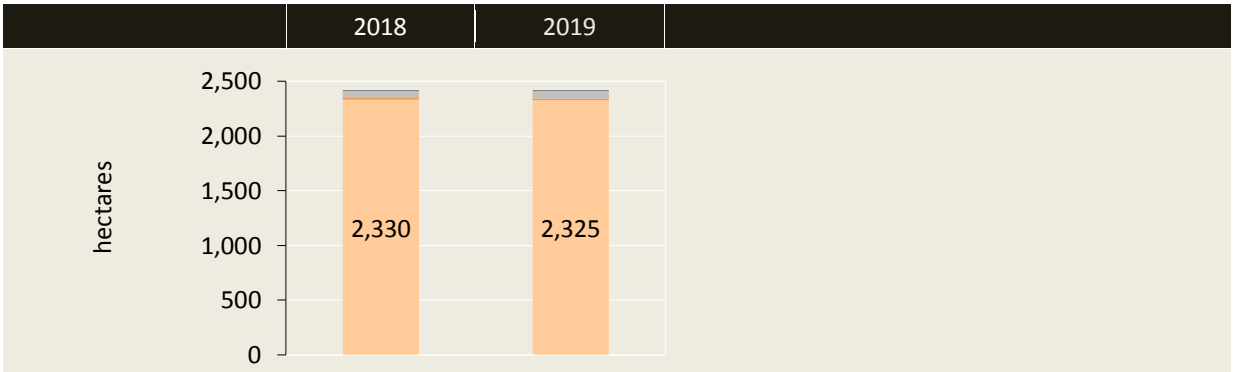
Figure 17 summarises the irrigable area in each salinity impact zone in the Robinvale irrigation district from 2018 to 2019. The Robinvale district is in low salinity impact zones L2 and L3. No irrigable areas are in the high salinity impact zone.

From 2018 to 2019, the area irrigated in:

- L2 decreased by 5 ha, a less than 1% decrease from 2,330 ha to 2,325 ha.
- L3 remained at 15 ha in 2018 and 2019.

The irrigable area in:

- L2 remained at 2,395 ha in 2018 and 2019.
- L3 remained at 25 ha in 2018 and 2019.



	Salinity impact zone	2018	2019	% of 2019 total	Change (ha) 2018 to 2019	% Change 2018 to 2019
Irrigated	L1	-	-	-	-	-
	L2	2,330	2,325	96%	-5	-<1%
	L3	15	15	1%	0	0%
	L4	-	-	-	-	-
	HIZ	-	-	-	-	-
Not Irrigated	L1	-	-	-	-	-
	L2	65	70	3%	+5	+8%
	L3	10	10	0%	0	0%
	L4	-	-	-	-	-
	HIZ	-	-	-	-	-
Total (ha)		2,420	2,420	100%	0	0%

Figure 17: Robinvale irrigation district - irrigable area in each salinity impact zone from 2018 to 2019

2.4 Red Cliffs irrigation district

In summary for the Red Cliffs irrigation district

Change in crop types from 2018 to 2019

The dominant crop type in the Red Cliffs district changed from wine grape plantings in 2018 to table grapes in 2019.

The main changes from 2018 to 2019 were:

1. Table grape plantings increased by 115 ha, a 12% increase from 995 ha to 1,110 ha.
2. Citrus plantings increased by 10 ha, an 8% increase from 120 ha to 130 ha.
3. Wine grape plantings decreased by 10 ha, a 1% decrease from 1,090 ha to 1,080 ha.
4. Olive trees decreased by 10 ha, a 25% decrease from 40 ha to 30 ha.
5. Field crops increased by 10 ha, a 6% increase from 170 ha to 180 ha.

Planting trends - permanent plantings, seasonal crops and vacant areas

From 2018 to 2019:

- Permanent plantings increased by 110 ha; a 4% increase from 2,880 ha to 2,990 ha.
- Seasonal cropping increased by 5 ha; a 1% increase from 475 ha to 480 ha.
- Vacant areas, previously permanent plantings, decreased by 125 ha; a 13% decrease from 1,000 ha to 875 ha.
- Vacant areas, previously seasonal crops, increased by 5 ha; a 6% increase from 85 ha to 90 ha.

Irrigation development - new and retired areas

The irrigable area in the Red Cliffs irrigation district decreased by 5 ha, a <1% decrease from 4,440 ha in 2018 to 4,435 ha in 2019. The 5 ha decrease was areas retired from irrigation.

Irrigation methods 2018 to 2019

Drippers remained the dominant irrigation method in 2018 and 2019. From 2018 to 2019:

- Drip irrigation increased by 125 ha, a 6% increase from 2,115 ha to 2,240 ha.
- Lowlevel irrigation increased by 5 ha, a 1% increase from 620 ha to 625 ha.
- Overhead irrigation decreased by 10 ha, a 2% decrease from 595 ha to 585 ha.
- Furrow irrigation decreased by 5 ha, a 20% decrease from 25 ha to 20 ha.

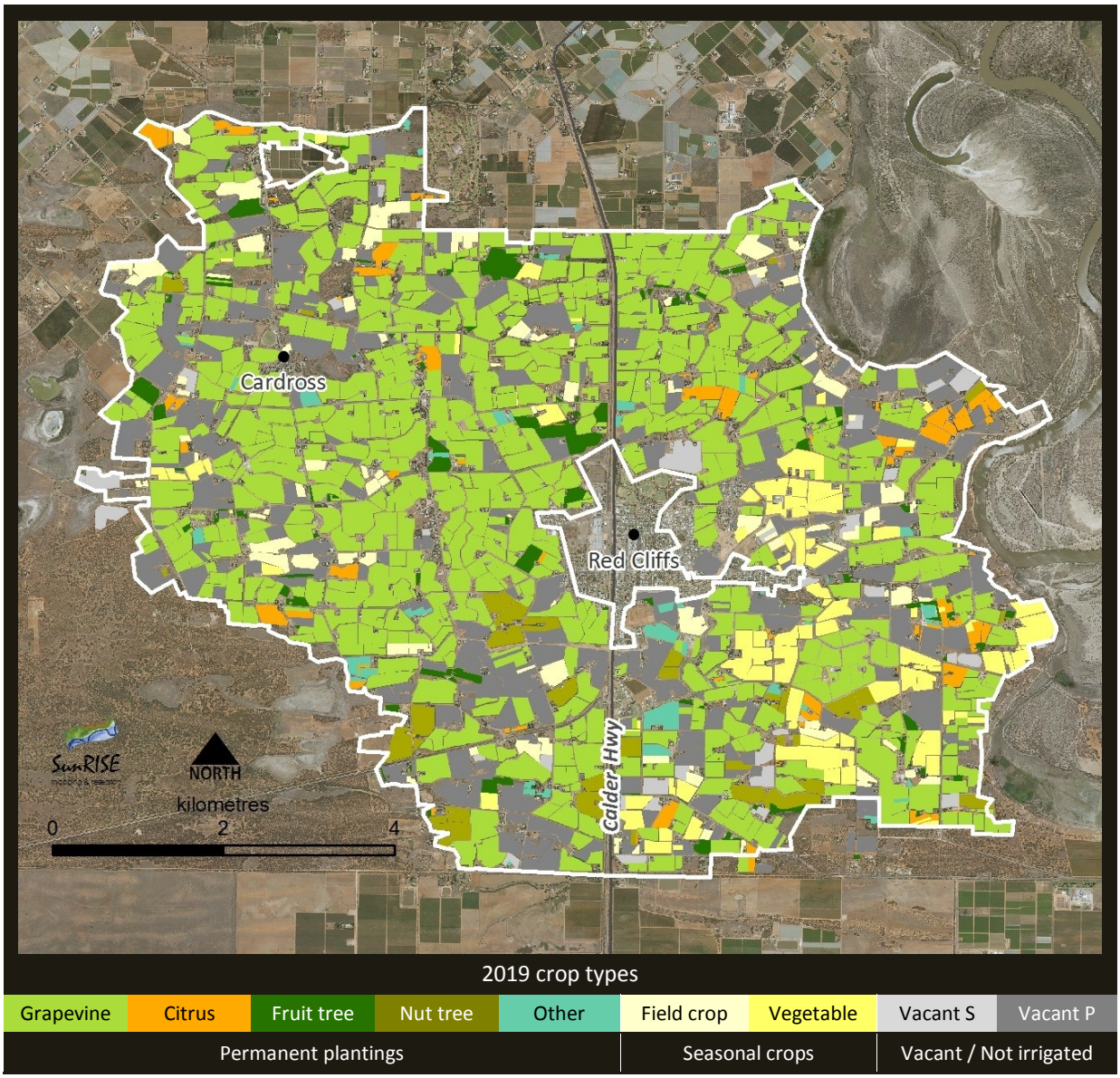
Salinity impact zones 2018 to 2019

The Red Cliffs irrigation district is in salinity zones: L1, L4 and HIZ. From 2018 to 2019 the irrigable area in:

- L1 remained at 1,485 ha in 2018 and 2019.
- L4 remained at 1,045 ha in 2018 and 2019.
- HIZ decreased by 5 ha, a less than 1% decrease from 1,910 ha to 1,905 ha. The 5 ha decrease were areas retired from irrigation.

2.4.1 Red Cliffs irrigation district - crop types in 2019

Map 6 shows the Red Cliffs irrigation district and crop types in 2019.



Map 6: Red Cliffs irrigation district showing 2019 crop types

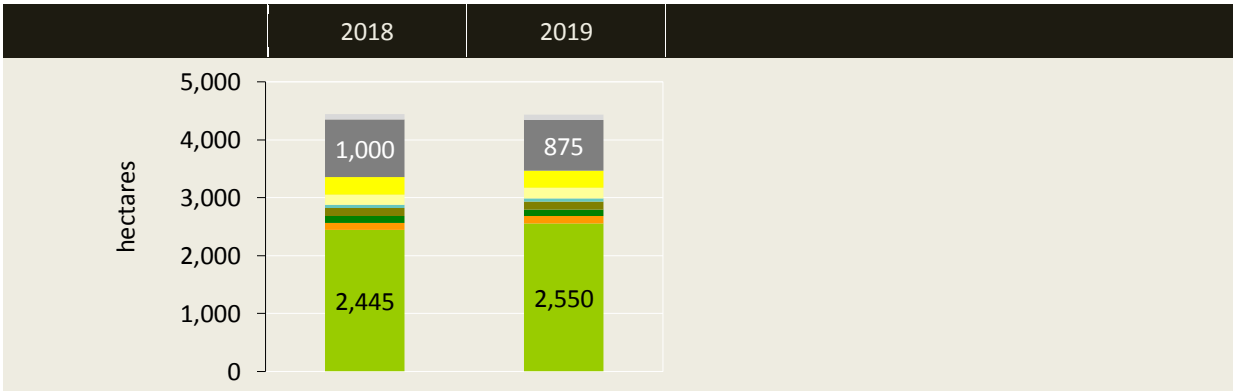
2.4.2 Red Cliffs irrigation district - crop types from 2018 to 2019

Figure 18 summarises the change in irrigated crops in the Red Cliffs irrigation district from 2018 to 2019.

The dominant crop type changed from wine grape plantings in 2018 to table grapes in 2019.

The main changes from 2018 to 2019 were:

1. Table grape plantings increased by 115 ha, a 12% increase from 995 ha to 1,110 ha.
2. Citrus plantings increased by 10 ha, an 8% increase from 120 ha to 130 ha.
3. Wine grape plantings decreased by 10 ha, a 1% decrease from 1,090 ha to 1,080 ha.
4. Olive trees decreased by 10 ha, a 25% decrease from 40 ha to 30 ha.
5. Field crops increased by 10 ha, a 6% increase from 170 ha to 180 ha.



	Crop type	2018 ha	2019 ha	% of 2019 total	Change (ha) 2018 to 2019	% Change 2018 to 2019
Permanent	Grape Dried	360	360	8%	0	0%
	Grape Table	995	1,110	25%	+115	+12%
	Grape Wine	1,090	1,080	24%	-10	-1%
	Citrus	120	130	3%	+10	+8%
	Fruit Olive	40	30	1%	-10	-25%
	Fruit Other	80	80	2%	0	0%
	Nut Almond	120	120	3%	0	0%
	Nut Other	20	25	1%	+5	+25%
	Other	55	55	1%	0	0%
Seasonal	Field Crop	170	180	4%	+10	+6%
	Veg. Carrot	-	-	-	-	-
	Veg. Potato	-	-	-	-	-
	Veg. Other	305	300	7%	-5	-2%
	Vacant P	1,000	875	20%	-125	-13%
	Vacant S	85	90	2%	+5	+6%
Total		4,440	4,435	100%	-5	0%

Figure 18: Red Cliffs irrigation district – change in crop types from 2018 to 2019

2.4.3 Red Cliffs irrigation district - planting trends

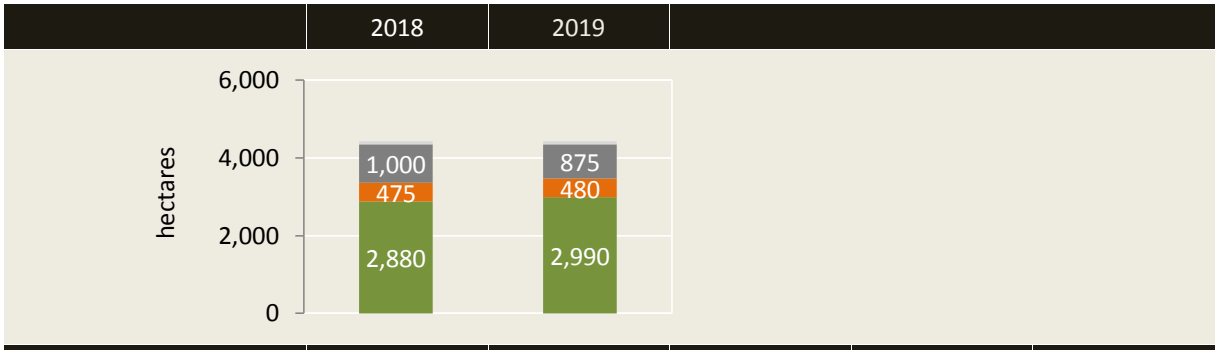
Figure 19 summarises planting trends in the Red Cliffs irrigation district from 2018 to 2019.

The proportion of permanent plantings, seasonal cropping and vacant areas changed from:

- 65% permanent, 11% seasonal and 24% vacant in 2018; to
- 67% permanent, 11% seasonal and 22% vacant in 2019.

From 2018 to 2019:

- Permanent plantings increased by 110 ha; a 4% increase from 2,880 ha to 2,990 ha.
- Seasonal cropping increased by 5 ha; a 1% increase from 475 ha to 480 ha.
- Vacant areas, previously permanent plantings, decreased by 125 ha; a 13% decrease from 1,000 ha to 875 ha.
- Vacant areas, previously seasonal crops, increased by 5 ha; a 6% increase from 85 ha to 90 ha.



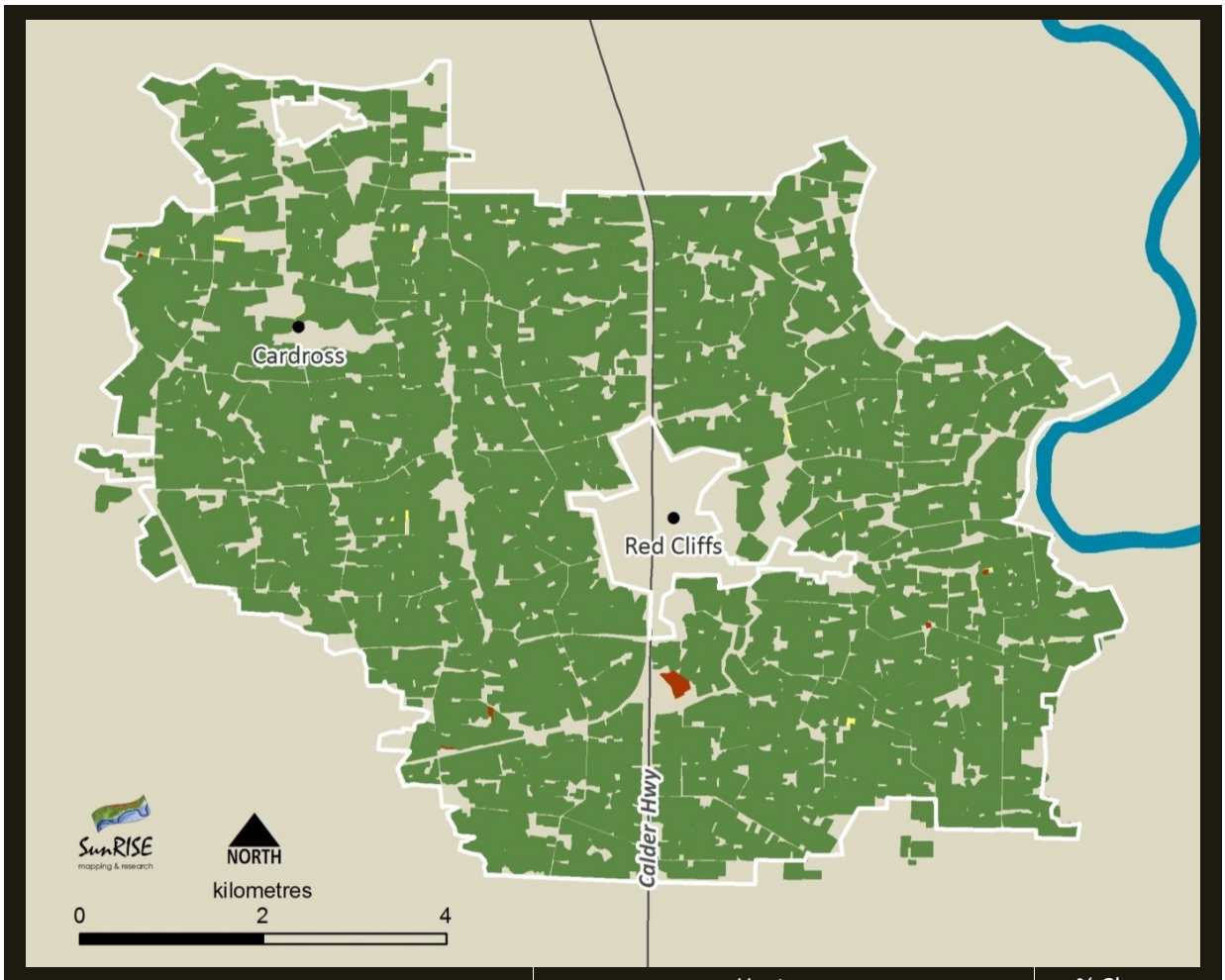
	2018	2019	% of 2019 total	Change (ha) 2018 to 2019	% Change 2018 to 2019
Permanent - irrigated	2,880	2,990	67%	+110	+4%
Seasonal - irrigated	475	480	11%	+5	+1%
Vacant - permanent	1,000	875	20%	-125	-13%
Vacant - seasonal	85	90	2%	+5	+6%
Total hectares	4,440	4,435	100%	-5	-<1%
% Permanent	65%	67%			
% Seasonal	11%	11%			
% Vacant	24%	22%			

Figure 19: Red Cliffs irrigation district - planting trends from 2018 to 2019

2.4.4 Red Cliffs irrigation district - irrigation development

Map 7 shows irrigation development from 2018 to 2019 in the Red Cliffs irrigation district with respect to new development (expansion) and areas retired[5] from irrigation.

- The irrigable area decreased by 5 ha, a < 1% decrease from 4,440 ha in 2018 to 4,435 ha in 2019.
- The 5 ha decrease was areas retired from irrigation.



	Hectares		% Change
Irrigation areas in 2018 (2017-18 season)	4,440		
Retired between 2018 and 2019	-5		-<1%
Expansion between 2018 and 2019	0		0%
Irrigation areas in 2019 (2018-19 season)	4,435		

Map 7: Red Cliffs irrigation district - irrigation development from 2018 to 2019

[5] Retired areas have undergone a change in land use that precludes use for irrigation e.g. urban development, housing, sheds, dams and land set aside for conservation purposes.

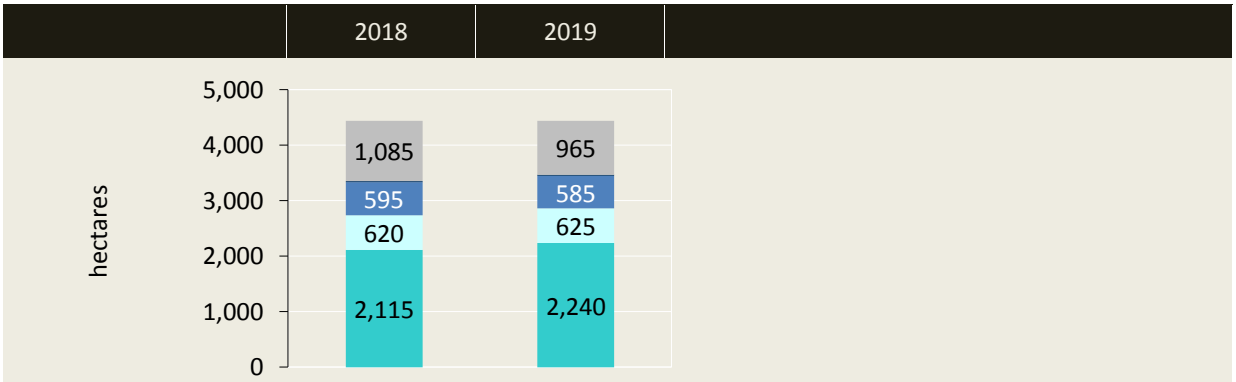
2.4.5 Red Cliffs irrigation district - irrigation methods

Figure 20 summarises the change in irrigation methods in the Red Cliffs irrigation district from 2018 to 2019.

Drippers remained the dominant irrigation method in 2018 and 2019.

From 2018 to 2019:

- Drip irrigation increased by 125 ha, a 6% increase from 2,115 ha to 2,240 ha.
- Lowlevel irrigation increased by 5 ha, a 1% increase from 620 ha to 625 ha.
- Overhead irrigation decreased by 10 ha, a 2% decrease from 595 ha to 585 ha.
- Furrow irrigation decreased by 5 ha, a 20% decrease from 25 ha to 20 ha.



Irrigation method	2018	2019	% of 2019 total	Change (ha) 2018 to 2019	% Change 2018 to 2019
Drip	2,115	2,240	51%	+125	+6%
Low level	620	625	14%	+5	+1%
Overhead	595	585	13%	-10	-2%
Furrow, flood	25	20	0%	-5	-20%
Vacant	1,085	965	22%	-120	-11%
Total hectares	4,440	4,435	100%	-5	< 1%

Figure 20: Red Cliffs irrigation district - irrigation methods from 2018 to 2019

2.4.6 Red Cliffs irrigation district - salinity impact zones

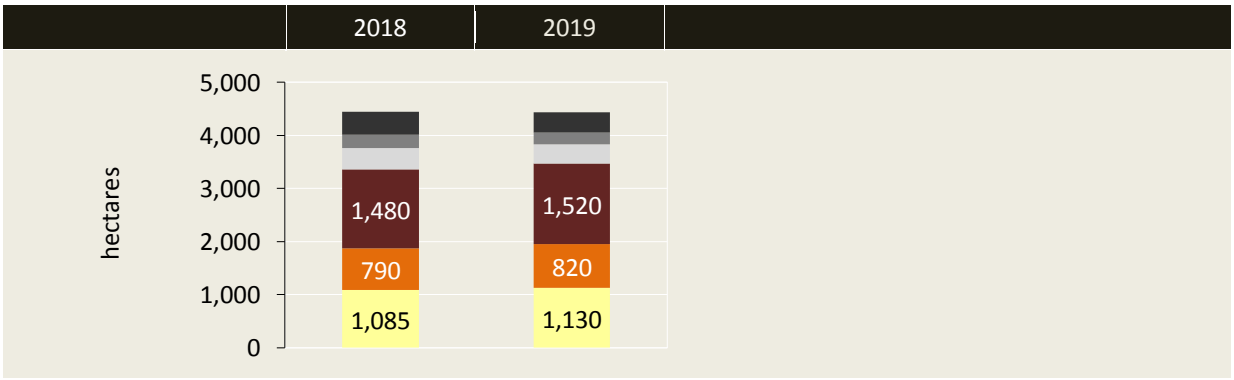
Figure 21 summarises the irrigable area in each salinity impact zone in the Red Cliffs irrigation district from 2018 to 2019. The Red Cliffs district is in low salinity impact zones L1 and L4, and in the high salinity impact zone, HIZ.

From 2018 to 2019, the area irrigated in:

- L1 increased by 45 ha, a 4% increase from 1,085 ha to 1,130 ha.
- L4 increased by 30 ha, a 4% increase from 790 ha to 820 ha.
- HIZ increased by 40 ha, a 3% increase from 1,480 ha to 1,520 ha. The increase was predominantly vacant areas in 2018 brought back into production in 2019.

From 2018 to 2019, the irrigable area in:

- L1 remained at 1,485 ha in 2018 and 2019.
- L4 remained at 1,045 ha in 2018 and 2019.
- HIZ decreased by 5 ha, a less than 1% decrease from 1,910 ha to 1,905 ha. The 5 ha decrease were areas retired from irrigation.



Salinity impact zone		2018	2019	% of 2019 total	Change (ha) 2018 to 2019	% Change 2018 to 2019
Irrigated	L1	1,085	1,130	25%	+45	+4%
	L2	-	-	-	-	-
	L3	-	-	-	-	-
	L4	790	820	18%	+30	+4%
	HIZ	1,480	1,520	34%	+40	+3%
Not Irrigated	L1	400	355	8%	-45	-11%
	L2	-	-	-	-	-
	L3	-	-	-	-	-
	L4	255	225	5%	-30	-12%
	HIZ	430	385	9%	-45	-10%
Total (ha)		4,440	4,435	100%	-5	0%

Figure 21: Red Cliffs irrigation district - irrigable area in each salinity impact zone from 2018 to 2019

2.5 Mildura irrigation district

In summary for the Mildura irrigation district

Change in crop types from 2018 to 2019

Table grape plantings were the dominant crop in 2018 and 2019.

The main changes from 2018 to 2019 were:

1. Table grape plantings increased by 140 ha, a 7% increase from 1,955 ha to 2,095 ha.
2. Dried grape plantings decreased by 45 ha, a 6% decrease from 725 ha to 680 ha.
3. Citrus plantings increased by 15 ha, a 15% increase from 100 ha to 115 ha.
4. Wine grape plantings decreased by 10 ha, a 1% decrease from 960 ha to 950 ha.
5. Field crops decreased by 10 ha, a 4% decrease from 255 ha to 245 ha.

Planting trends - permanent plantings, seasonal crops and vacant areas

From 2018 to 2019:

- Permanent plantings increased by 100 ha; a 3% increase from 3,970 ha to 4,070 ha.
- Seasonal cropping decreased by 10 ha; a 3% decrease from 380 ha to 370 ha.
- Vacant areas, previously permanent plantings, decreased by 45 ha; a 4% decrease from 1,225 ha to 1,180 ha.
- Vacant areas, previously seasonal crops, decreased by 45 ha; an 18% decrease from 255 ha to 210 ha.

Irrigation development - new and retired areas

The irrigable area in the Mildura irrigation district remained at 5,830 ha in 2018 and in 2019. There were 15 ha retired from irrigation and 15 ha of expansion.

Irrigation methods 2018 to 2019

Drippers remained the dominant irrigation method in 2018 and 2019. From 2018 to 2019:

- Drip irrigation increased by 80 ha, a 3% increase from 2,385 ha to 2,465 ha.
- Lowlevel irrigation increased by 65 ha, a 6% increase from 1,145 ha to 1,210.
- Overhead irrigation decreased by 45 ha, a 7% decrease from 625 ha to 580 ha.
- Furrow irrigation decreased by 10 ha, a 5% decrease from 195 ha to 185 ha.

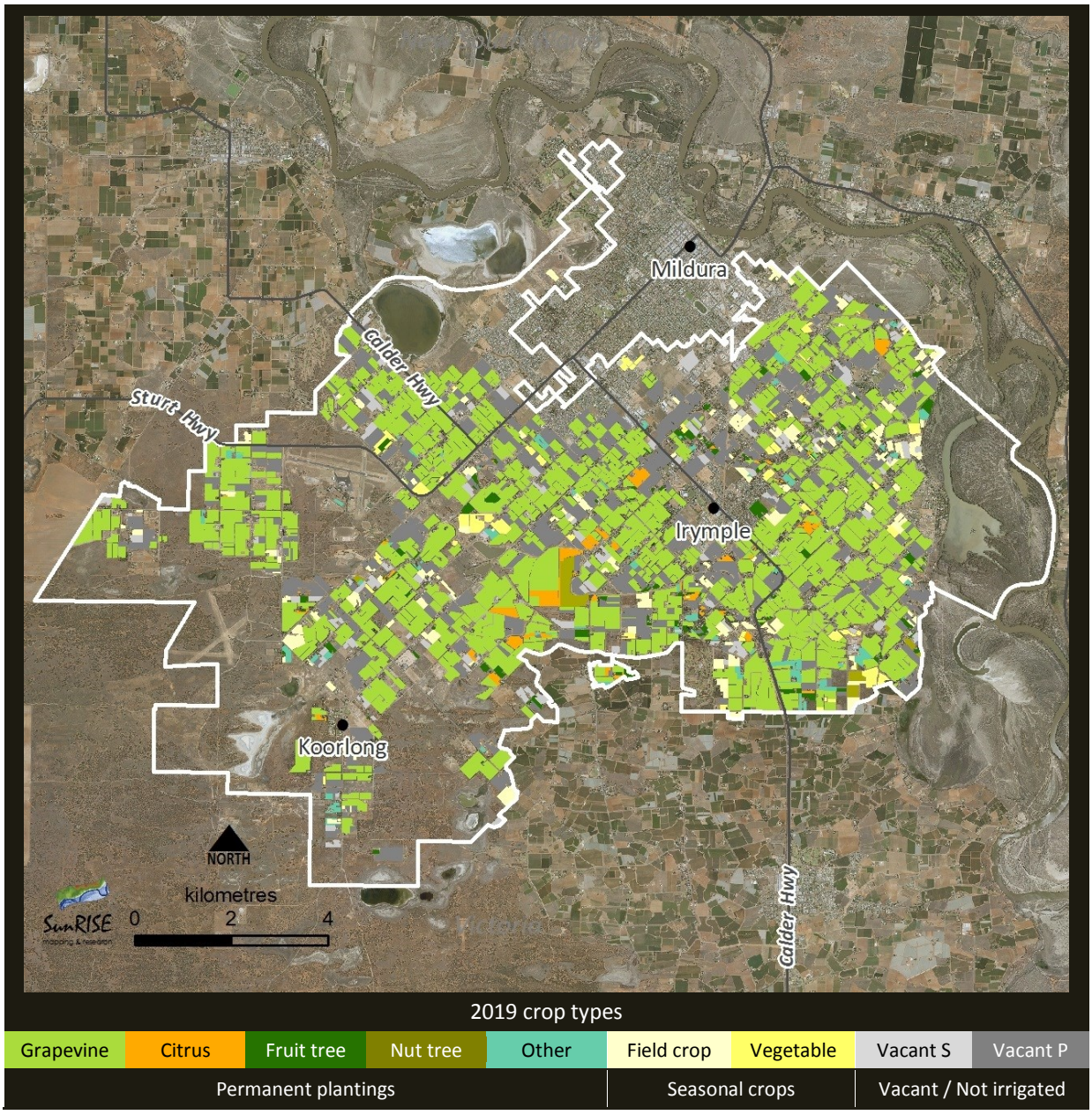
Salinity impact zones 2018 to 2019

The Mildura irrigation district is in the lowest salinity impact zone, L1 and in the high impact zone, HIZ. From 2018 to 2019, the irrigable area in:

- L1 increased by 15 ha, a 1% increase from 2,115 ha to 2,130 ha.
- HIZ decreased by 15 ha, a less than 1% decrease from 3,715 ha to 3,700 ha. The 15 ha decrease were areas retired from irrigation.

2.5.1 Mildura irrigation district - crop types in 2019

Map 8 shows the Mildura irrigation district and crop types in 2019.



Map 8: Mildura irrigation district showing 2019 crop types

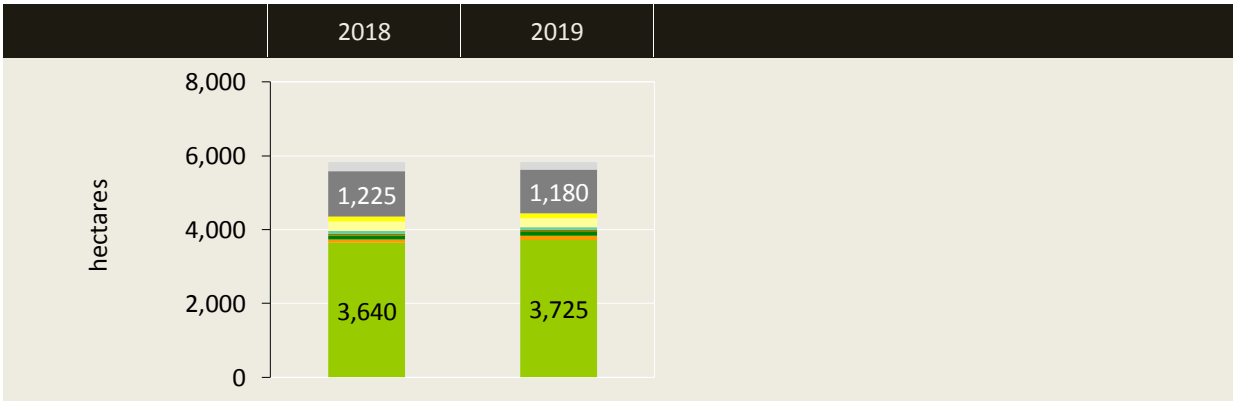
2.5.2 Mildura irrigation district - crop types from 2018 to 2019

Figure 22 summarises the change in irrigated crops in the Mildura irrigation district from 2018 to 2019.

Table grape plantings were the dominant crop in 2018 and 2019.

The main changes from 2018 to 2019 were:

1. Table grape plantings increased by 140 ha, a 7% increase from 1,955 ha to 2,095 ha.
2. Dried grape plantings decreased by 45 ha, a 6% decrease from 725 ha to 680 ha.
3. Citrus plantings increased by 15 ha, a 15% increase from 100 ha to 115 ha.
4. Wine grape plantings decreased by 10 ha, a 1% decrease from 960 ha to 950 ha.
5. Field crops decreased by 10 ha, a 4% decrease from 255 ha to 245 ha.



	Crop type	2018 ha	2019 ha	% of 2019 total	Change (ha) 2018 to 2019	% Change 2018 to 2019
Permanent	Grape Dried	725	680	12%	-45	-6%
	Grape Table	1,955	2,095	36%	+140	+7%
	Grape Wine	960	950	16%	-10	-1%
	Citrus	100	115	2%	+15	+15%
	Fruit Olive	40	45	1%	+5	+13%
	Fruit Other	55	50	1%	-5	-9%
	Nut Almond	40	45	1%	+5	+13%
	Nut Other	10	10	<1%	0	0%
	Other	85	80	1%	-5	-6%
Seasonal	Field Crop	255	245	4%	-10	-4%
	Veg. Carrot	-	-	-	-	-
	Veg. Potato	-	-	-	-	-
	Veg. Other	125	125	2%	0	0%
	Vacant P	1,225	1,180	20%	-45	-4%
	Vacant S	255	210	4%	-45	-18%
Total		5,830	5,830	100%	0	0%

Figure 22: Mildura irrigation district - crop types from 2018 to 2019

2.5.3 Mildura irrigation district - planting trends

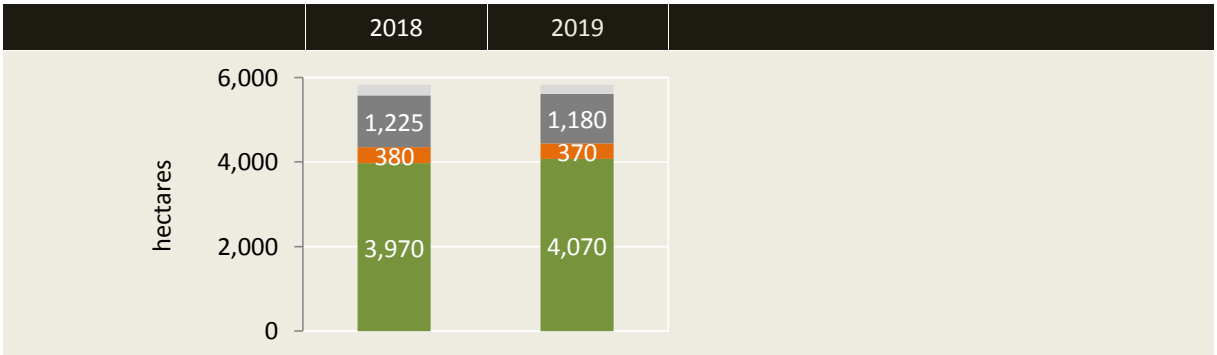
Figure 23 summarises planting trends in the Mildura irrigation district from 2018 to 2019.

The proportion of permanent plantings, seasonal cropping and vacant areas changed from:

- 68% permanent, 7% seasonal and 25% vacant in 2018; to
- 70% permanent, 6% seasonal and 24% vacant in 2019.

From 2018 to 2019:

- Permanent plantings increased by 100 ha; a 3% increase from 3,970 ha to 4,070 ha.
- Seasonal cropping decreased by 10 ha; a 3% decrease from 380 ha to 370 ha.
- Vacant areas, previously permanent plantings, decreased by 45 ha; a 4% decrease from 1,225 ha to 1,180 ha.
- Vacant areas, previously seasonal crops, decreased by 45 ha; an 18% decrease from 255 ha to 210 ha.



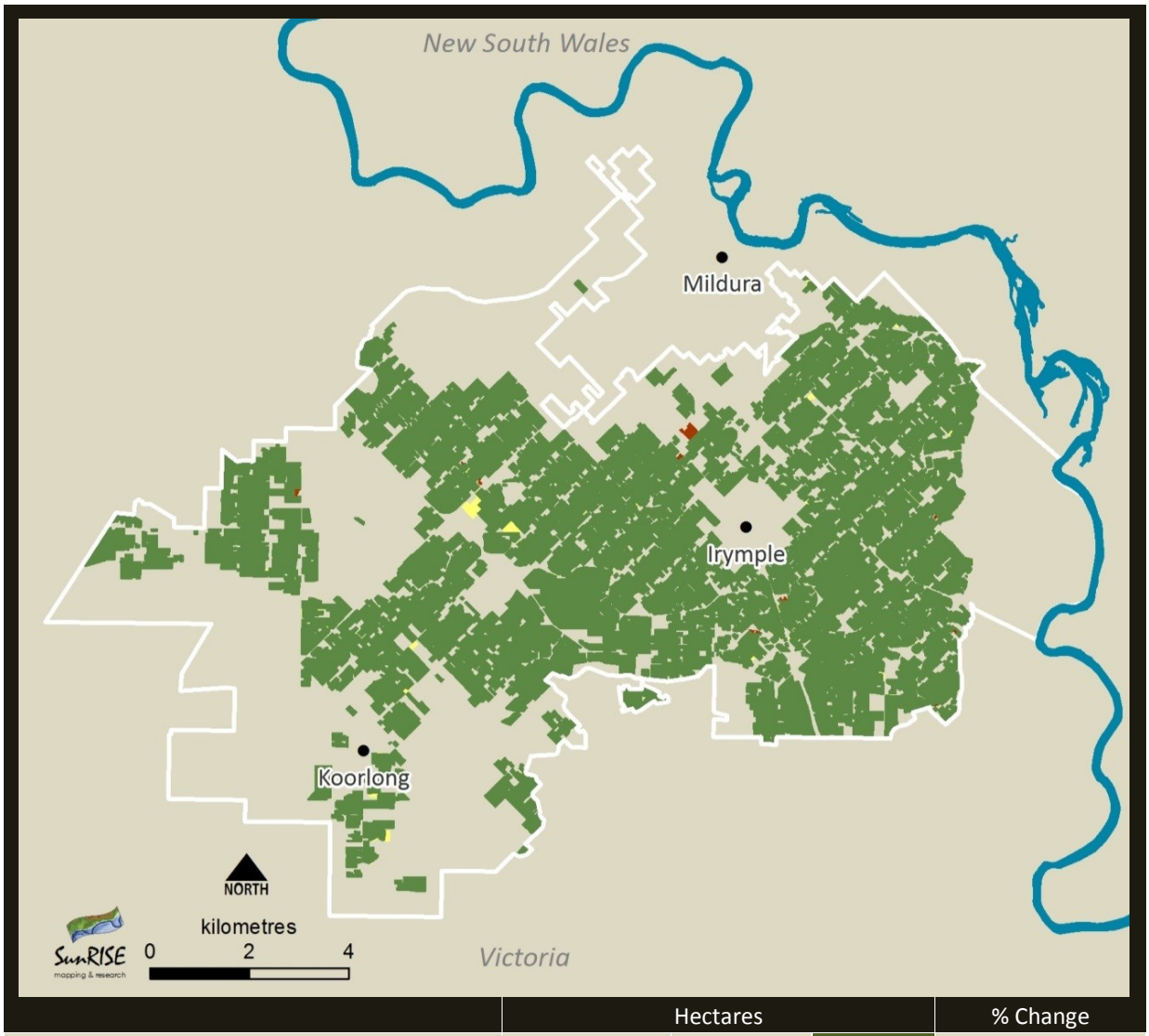
	2018	2019	% of 2019 total	Change (ha) 2018 to 2019	% Change 2018 to 2019
Permanent - irrigated	3,970	4,070	70%	+100	+3%
Seasonal - irrigated	380	370	6%	-10	-3%
Vacant - permanent	1,225	1,180	20%	-45	-4%
Vacant - seasonal	255	210	4%	-45	-18%
Total hectares	5,830	5,830	100%	0	0%
% Permanent	68%	70%			
% Seasonal	7%	6%			
% Vacant	25%	24%			

Figure 23: Mildura irrigation district - planting trends from 2018 to 2019

2.5.4 Mildura irrigation district - irrigation development

Map 9 shows irrigation development from 2018 to 2019 in the Mildura irrigation district with respect to new development (expansion) and areas retired[6] from irrigation.

- The irrigable area remained at 5,830 ha in 2018 and in 2019.
- There were 15 ha retired from irrigation and 15 ha of expansion.



	Hectares		% Change
Irrigation areas in 2018 (2017-18 season)	5,830		
Retired between 2018 and 2019	-15		-<1%
Expansion between 2018 and 2019	+15		+<1%
Irrigation areas in 2019 (2018-19 season)	5,830		

Map 9: Mildura irrigation district - irrigation development from 2018 to 2019

[6] Retired areas have undergone a change in land use that precludes use for irrigation e.g. urban development, housing, sheds, dams and land set aside for conservation purposes.

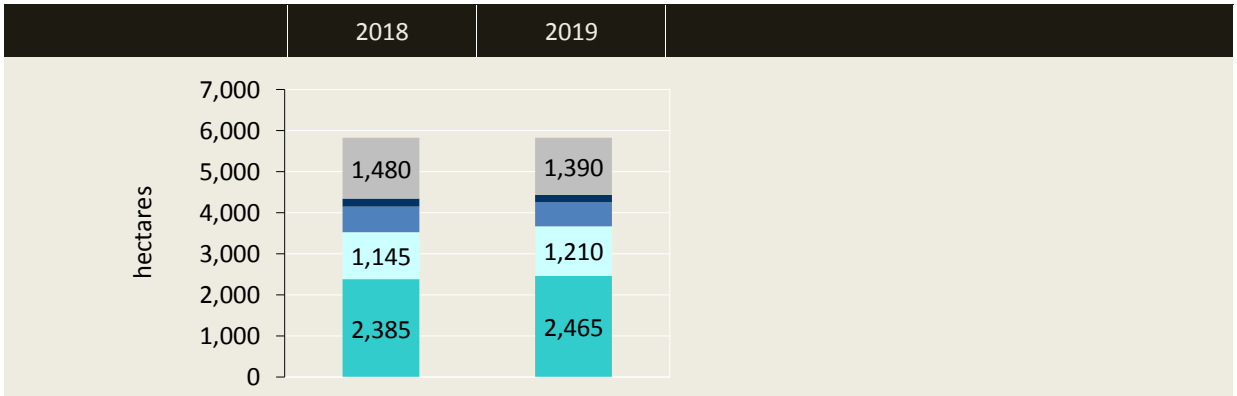
2.5.5 Mildura irrigation district - irrigation methods

Figure 24 summarises the change in irrigation methods in the Mildura irrigation district from 2018 to 2019.

Drippers remained the dominant irrigation method in 2018 and 2019.

From 2018 to 2019:

- Drip irrigation increased by 80 ha, a 3% increase from 2,385 ha to 2,465 ha.
- Lowlevel irrigation increased by 65 ha, a 6% increase from 1,145 ha to 1,210.
- Overhead irrigation decreased by 45 ha, a 7% decrease from 625 ha to 580 ha.
- Furrow irrigation decreased by 10 ha, a 5% decrease from 195 ha to 185 ha.



Irrigation method	2018	2019	% of 2019 total	Change (ha) 2018 to 2019	% Change 2018 to 2019
Drip	2,385	2,465	42%	+80	+3%
Low level	1,145	1,210	21%	+65	+6%
Overhead	625	580	10%	-45	-7%
Furrow, flood	195	185	3%	-10	-5%
Vacant	1,480	1,390	24%	-90	-6%
Total hectares	5,830	5,830	100%	0	0%

Figure 24: Mildura irrigation district - irrigation methods from 2018 to 2019

2.5.6 Mildura irrigation district - salinity impact zones

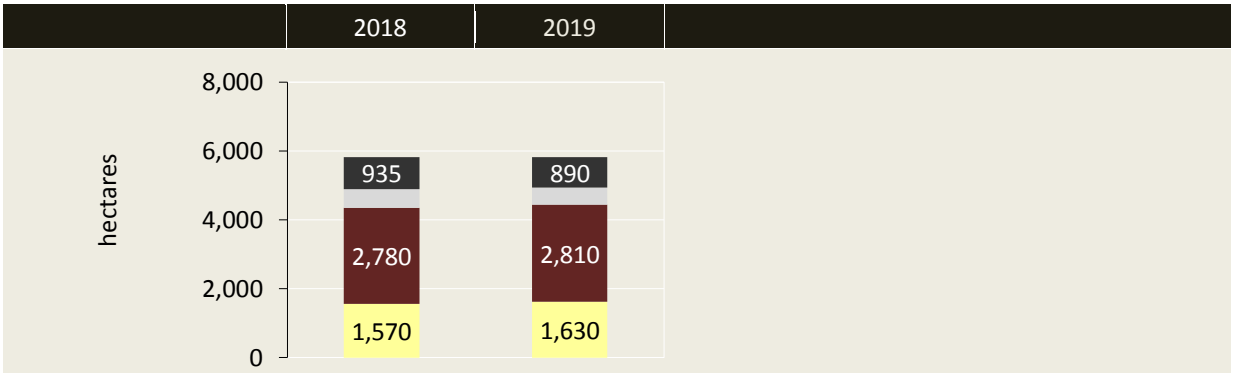
Figure 25 summarises the irrigable area in each salinity impact zone in the Mildura irrigation district from 2018 to 2019. The Mildura district is in the lowest salinity impact zone, L1 and in the high salinity impact zone, HIZ.

From 2018 to 2019, the area irrigated in:

- L1 increased by 60 ha, a 4% increase from 1,570 ha to 1,630 ha.
- HIZ increased by 30 ha, a 1% increase from 2,780 ha to 2,810 ha. The increase was predominantly vacant areas in 2018 brought back into production in 2019.

From 2018 to 2019, the irrigable area in:

- L1 increased by 15 ha, a 1% increase from 2,115 ha to 2,130 ha.
- HIZ decreased by 15 ha, a less than 1% decrease from 3,715 ha to 3,700 ha. The 15 ha decrease were areas retired from irrigation.



Salinity impact zone		2018	2019	% of 2019 total	Change (ha) 2018 to 2019	% Change 2018 to 2019
Irrigated	L1	1,570	1,630	28%	+60	+4%
	L2	-	-	-	-	-
	L3	-	-	-	-	-
	L4	-	-	-	-	-
	HIZ	2,780	2,810	48%	+30	+1%
Not Irrigated	L1	545	500	9%	-45	-8%
	L2	-	-	-	-	-
	L3	-	-	-	-	-
	L4	-	-	-	-	-
	HIZ	935	890	15%	-45	-5%
Total (ha)		5,830	5,830	100%	0	0%

Figure 25: Mildura irrigation district - irrigable area in each salinity impact zone from 2018 to 2019

2.6 Merbein irrigation district

In summary for the Merbein irrigation district

Change in crop types from 2018 to 2019

The dominant crop type changed from dried grape plantings in 2018 to table grapes in 2019.

The main changes from 2018 to 2019 were:

1. Dried grape plantings decreased by 60 ha, a 9% decrease from 635 ha to 575 ha.
2. Table grape plantings increased by 55 ha, a 10% increase from 550 ha to 605 ha.
3. Field crops increased by 20 ha, a 24% increase from 85 ha to 105 ha.
4. Nut trees, pistachios, increased by 15 ha, a 15% increase from 100 ha to 115 ha.

Planting trends - permanent plantings, seasonal crops and vacant areas

From 2018 to 2019:

- Permanent plantings increased by 15 ha; a 1% increase from 1,740 ha to 1,755 ha.
- Seasonal cropping increased by 15 ha; an 8% increase from 190 ha to 205 ha.
- Vacant areas, previously permanent plantings, decreased by 40 ha; a 4% decrease from 980 ha to 940 ha.
- Vacant areas, previously seasonal crops, increased by 5 ha; a 5% increase from 95 ha to 100 ha.

Irrigation development - new and retired areas

The irrigable area in the Merbein irrigation district decreased by 5 ha, a < 1% decrease from 3,005 ha in 2018 to 3,000 ha in 2019. There were 5 ha retired from irrigation.

Irrigation methods 2018 to 2019

Drippers remained the dominant irrigation method in 2018 and 2019. From 2018 to 2019:

- Drip irrigation increased by 55 ha, a 5% increase from 1,150 ha to 1,205 ha;
- Lowlevel irrigation remained at 430 ha in 2018 and in 2019;
- Overhead irrigation increased by 10 ha, a 7% increase from 150 ha to 160 ha; and
- Furrow irrigation decreased by 35 ha, an 18% decrease from 200 ha to 165 ha.

Salinity impact zones 2018 to 2019

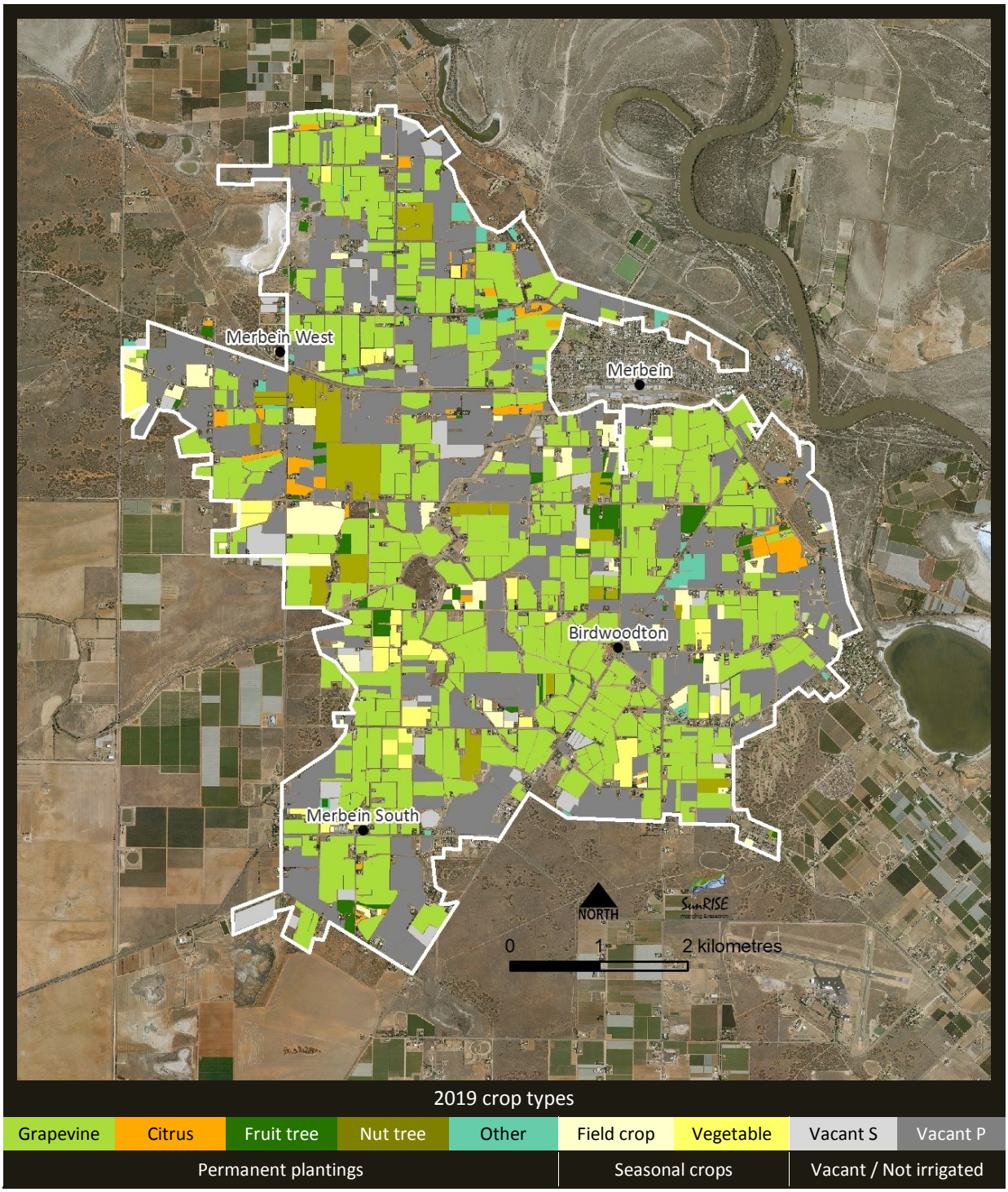
The Merbein district is in the lowest salinity impact zone, L1 and in the high salinity impact zone, HIZ.

From 2018 to 2019, the irrigable area in:

- L1 decreased by 5 ha, a less than 1% decrease from 1,015 ha to 1,010 ha.
- HIZ decreased by 5 ha, a less than 1% decrease from 1,990 ha to 1,985 ha.

2.6.1 Merbein irrigation district - crop types in 2019

Map 10 shows the Merbein irrigation district and crop types in 2019.



Map 10: Merbein irrigation district showing 2019 crop types

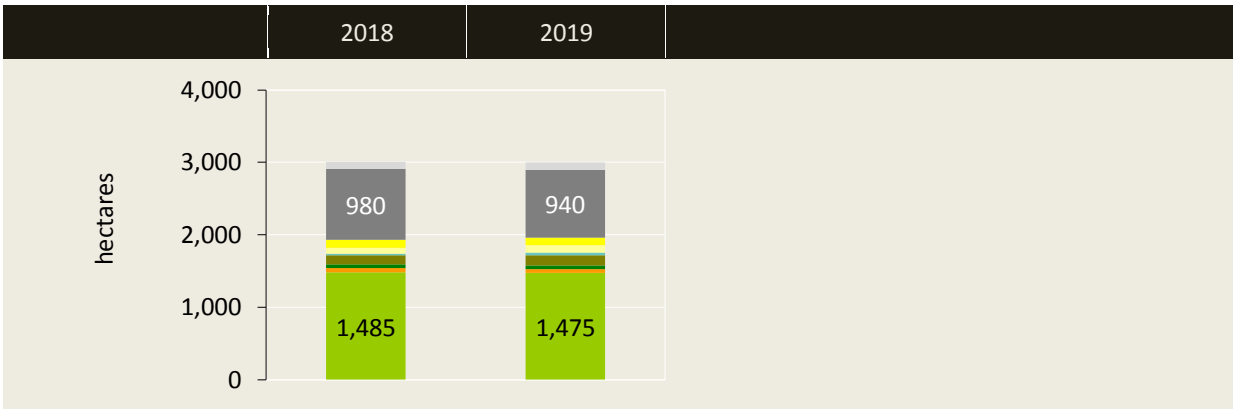
2.6.2 Merbein irrigation district - crop types from 2018 to 2019

Figure 26 summarises the change in irrigated crops in the Merbein irrigation district from 2018 to 2019.

The dominant crop type changed from dried grape plantings in 2018 to table grapes in 2019.

The main changes from 2018 to 2019 were:

1. Dried grape plantings decreased by 60 ha, a 9% decrease from 635 ha to 575 ha.
2. Table grape plantings increased by 55 ha, a 10% increase from 550 ha to 605 ha.
3. Field crops increased by 20 ha, a 24% increase from 85 ha to 105 ha.
4. Nut trees, pistachios, increased by 15 ha, a 15% increase from 100 ha to 115 ha.



Crop type		2018 ha	2019 ha	% of 2019 total	Change (ha) 2018 to 2019	% Change 2018 to 2019
Permanent	Grape Dried	635	575	19%	-60	-9%
	Grape Table	550	605	20%	+55	+10%
	Grape Wine	300	295	10%	-5	-2%
	Citrus	55	55	2%	0	0%
	Fruit Olive	15	15	1%	0	0%
	Fruit Other	35	35	1%	0	0%
	Nut Almond	25	25	1%	0	0%
	Nut Other	100	115	4%	+15	+15%
	Other	25	35	1%	+10	+40%
Seasonal	Field Crop	85	105	4%	+20	+24%
	Veg. Carrot	-	-	-	-	-
	Veg. Potato	-	-	-	-	-
	Veg. Other	105	100	3%	-5	-5%
	Vacant P	980	940	31%	-40	-4%
	Vacant S	95	100	3%	+5	+5%
Total		3,005	3,000	100%	-5	0%

Figure 26: Merbein irrigation district - crop types from 2018 to 2019

2.6.3 Merbein irrigation district - planting trends

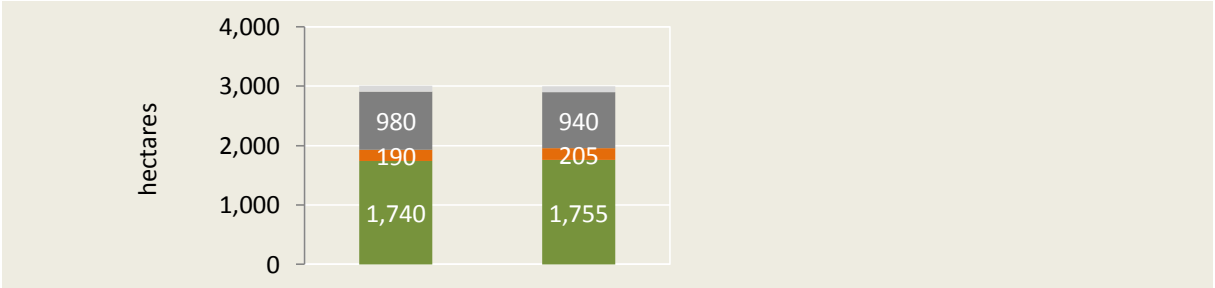
Figure 27 summarises planting trends in the Merbein irrigation district from 2018 to 2019.

The proportion of permanent plantings, seasonal cropping and vacant areas changed from:

- 58% permanent, 6% seasonal and 36% vacant in 2018; to
- 59% permanent, 7% seasonal and 34% vacant in 2019.

From 2018 to 2019:

- Permanent plantings increased by 15 ha; a 1% increase from 1,740 ha to 1,755 ha.
- Seasonal cropping increased by 15 ha; an 8% increase from 190 ha to 205 ha.
- Vacant areas, previously permanent plantings, decreased by 40 ha; a 4% decrease from 980 ha to 940 ha.
- Vacant areas, previously seasonal crops, increased by 5 ha; a 5% increase from 95 ha to 100 ha.



	2018	2019	% of 2019 total	Change (ha) 2018 to 2019	% Change 2018 to 2019
Permanent - irrigated	1,740	1,755	59%	+15	+1%
Seasonal - irrigated	190	205	7%	+15	+8%
Vacant - permanent	980	940	31%	-40	-4%
Vacant - seasonal	95	100	3%	+5	+5%
Total hectares	3,005	3,000	100%	-5	0%
% Permanent	58%	59%			
% Seasonal	6%	7%			
% Vacant	36%	34%			

Figure 27: Merbein irrigation district - planting trends from 2018 to 2019

2.6.4 Merbein irrigation district - irrigation development

Map 11 shows irrigation development from 2018 to 2019 in the Merbein irrigation district with respect to new development (expansion) and areas retired[7] from irrigation.

- The irrigable area decreased by 5 ha, a < 1% decrease from 3,005 ha in 2018 to 3,000 ha in 2019.
- The decrease of 5 ha was land retired from irrigation.

	Hectares		% Change
Irrigation areas in 2018 (2017-18 season)	3,005		
Retired between 2018 and 2019	-5		-<1%
Expansion between 2018 and 2019	0		0%
Irrigation areas in 2019 (2018-19 season)	3,000		

Map 11: Merbein irrigation district - irrigation development from 2018 to 2019

[7] Retired areas have undergone a change in land use that precludes use for irrigation e.g. urban development, housing, sheds, dams and land set aside for conservation purposes.

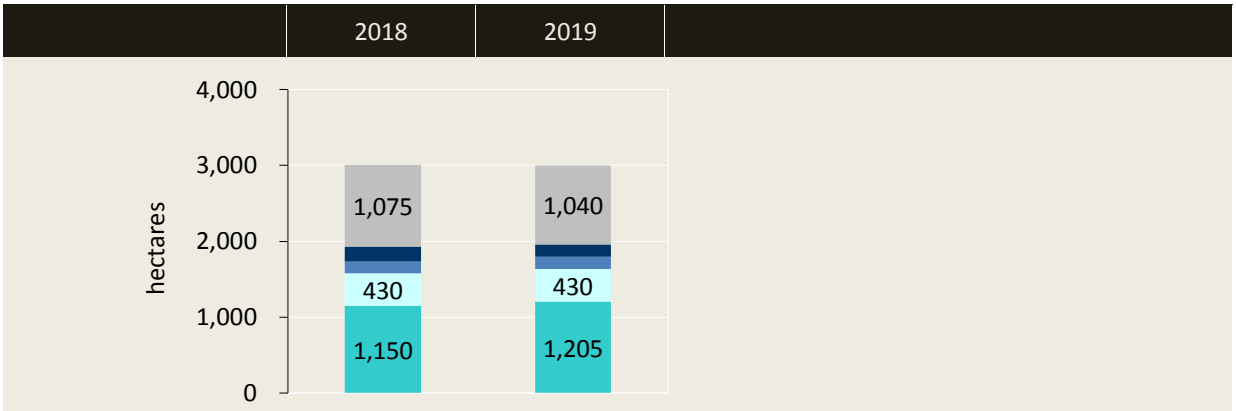
2.6.5 Merbein irrigation district - irrigation methods

Figure 28 summarises the change in irrigation methods in the Merbein irrigation district from 2018 to 2019.

Drippers remained the dominant irrigation method in 2018 and 2019.

From 2018 to 2019:

- Drip irrigation increased by 55 ha, a 5% increase from 1,150 ha to 1,205 ha;
- Lowlevel irrigation remained at 430 ha in 2018 and in 2019;
- Overhead irrigation increased by 10 ha, a 7% increase from 150 ha to 160 ha; and
- Furrow irrigation decreased by 35 ha, an 18% decrease from 200 ha to 165 ha.



Irrigation method	2018	2019	% of 2019 total	Change (ha) 2018 to 2019	% Change 2018 to 2019
Drip	1,150	1,205	40%	+55	+5%
Low level	430	430	14%	0	0%
Overhead	150	160	5%	+10	+7%
Furrow, flood	200	165	6%	-35	-18%
Vacant	1,075	1,040	35%	-35	-3%
Total hectares	3,005	3,000	100%	-5	-<1%

Figure 28: Merbein irrigation district - irrigation methods from 2018 to 2019

2.6.6 Merbein irrigation district - salinity impact zones

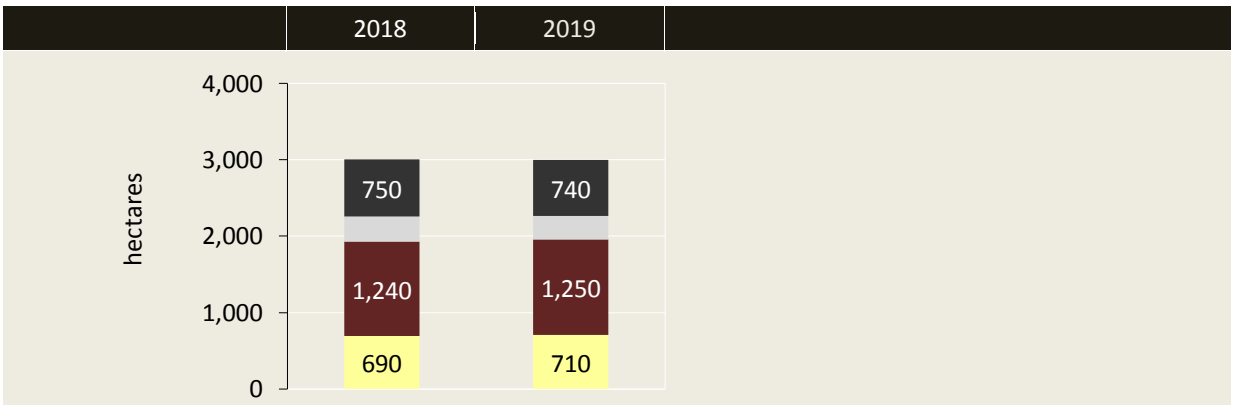
Figure 29 summarises the irrigable area in each salinity impact zone in the Merbein irrigation district from 2018 to 2019. The Merbein district is in the lowest salinity impact zone, L1 and the high salinity impact zone, HIZ.

From 2018 to 2019, the area irrigated in:

- L1 increased by 20 ha, a 3% increase from 690 ha to 710 ha.
- HIZ increased by 10 ha, a 1% increase from 1,240 ha to 1,250 ha.

From 2018 to 2019, the irrigable area in:

- L1 decreased by 5 ha, a less than 1% decrease from 1,015 ha to 1,010 ha.
- HIZ remained at 1,990 ha in 2018 and 2019.



Salinity impact zone		2018	2019	% of 2019 total	Change (ha) 2018 to 2019	% Change 2018 to 2019
Irrigated	L1	690	710	24%	+20	+3%
	L2	-	-	-	-	-
	L3	-	-	-	-	-
	L4	-	-	-	-	-
	HIZ	1,240	1,250	42%	+10	+1%
Not Irrigated	L1	325	300	10%	-25	-8%
	L2	-	-	-	-	-
	L3	-	-	-	-	-
	L4	-	-	-	-	-
	HIZ	750	740	25%	-10	-1%
Total (ha)		3,005	3,000	100%	-5	-<1%

Figure 29: Merbein irrigation district - irrigable area in each salinity impact zone from 2018 to 2019

3. Private diverters

3.1 Private diverters summary

In summary for private diverters, Nyah to South Australia

Change in crop types from 2018 to 2019

Almond trees were the dominant crop type in 2018 and 2019.

The main changes from 2018 to 2019 were:

1. Almond plantings increased by 1,225 ha, a 5% increase from 24,295 ha to 25,520 ha.
2. Table grape plantings increased by 330 ha, a 10% increase from 3,375 ha to 3,705 ha.
3. Wine grape plantings increased by 275 ha, a 5% increase from 5,170 ha to 5,445 ha.
4. Other nut trees, mainly pistachios, increased by 225 ha, a 66% increase from 340 ha to 565 ha.
5. Citrus plantings increased by 170 ha, a 4% increase from 3,850 ha to 4,020 ha.
6. Carrot crops decreased by 175 ha, a 12% decrease from 1,515 ha to 1,340 ha.
7. Potato crops increased by 95 ha, a 5% increase from 1,740 ha to 1,835 ha.

Planting trends - permanent plantings, seasonal crops and vacant areas

From 2018 to 2019:

- Permanent plantings increased by 2,285 ha; a 5% increase from 43,825 ha to 46,110 ha.
- Seasonal cropping decreased by 145 ha; a 1% decrease from 9,700 ha to 9,555 ha.
- Vacant areas, previously permanent plantings, decreased by 405 ha; a 14% decrease from 2,940 ha to 2,535 ha.
- Vacant areas, previously seasonal crops, increased by 725 ha; a 14% increase from 5,045 ha to 5,770 ha.

Irrigation development - expansion and retired areas

Across the private diverter river reaches, the irrigable area increased by 2,460 ha, a 4% increase from 61,510 ha in 2018 to 63,970 ha in 2019.

The net increase of 2,460 ha was the balance of 2,480 ha of expansion and 20 ha retired from irrigation.

Expansion occurred in each of the six river reaches. The largest growth areas from 2018 to 2019 were:

- the Wemen river reach with a net increase in irrigable area of 895 ha; and
- the Boundary Bend river reach with a net increase in irrigable area of 650 ha.

In summary for private diverters, Nyah to South Australia

Irrigation methods 2018 to 2019

Drip irrigation remained the dominant irrigation method in the private diverter areas in 2018 and 2019.

From 2018 to 2019:

- Drip irrigation increased by 2,270 ha, a 6% increase from 39,915 ha to 42,185 ha.
- Lowlevel irrigation increased by 30 ha, a 1% increase from 4,655 ha to 4,685 ha.
- Overhead irrigation increased by 50 ha, a 1% increase from 7,185 ha to 7,235 ha.
- Furrow irrigation decreased by 210 ha, a 12% decrease from 1,770 ha to 1,560 ha.

Salinity impact zones 2018 to 2019

Irrigable areas across the private diverter river reaches were predominantly in the lowest salinity impact zone, L1, in 2018 and 2019.

From 2018 to 2019, the irrigable area in:

- L1 increased by 2,045 ha, a 6% increase from 34,520 ha to 36,565 ha.
- L2 to L4 increased by 420 ha, a 2% increase from 24,015 ha to 24,435 ha.
- HIZ decreased by 5 ha (retired areas), a less than 1% decrease from 2,975 ha to 2,970 ha.

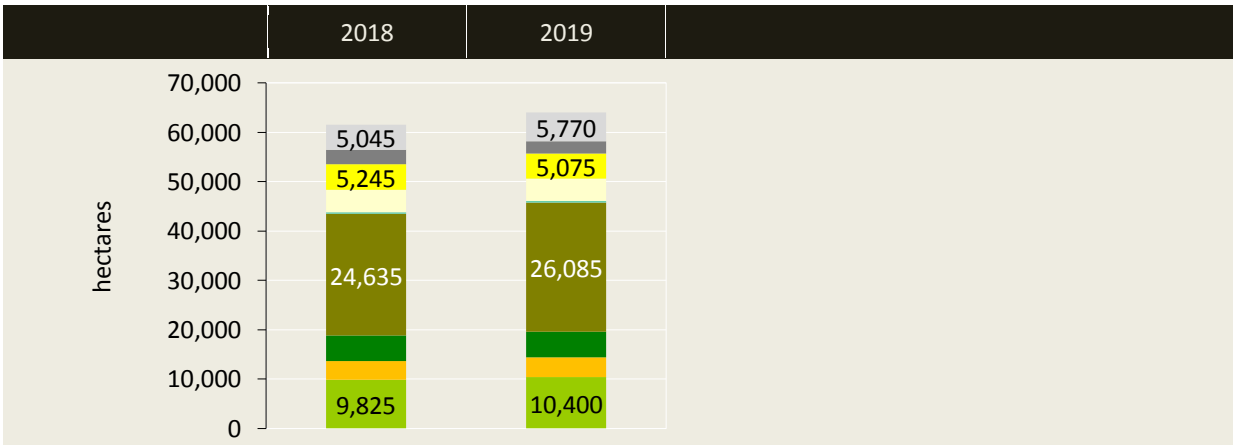
3.1.1 Private diverters summary - crop types from 2018 to 2019

Figure 30 summarises the change in irrigated crops across the six private diverter river reaches from 2018 to 2019.

Almond trees were the dominant crop type in 2018 and 2019.

The main changes from 2018 to 2019 were:

1. Almond plantings increased by 1,225 ha, a 5% increase from 24,295 ha to 25,520 ha.
2. Table grape plantings increased by 330 ha, a 10% increase from 3,375 ha to 3,705 ha.
3. Wine grape plantings increased by 275 ha, a 5% increase from 5,170 ha to 5,445 ha.
4. Other nut trees, mainly pistachios, increased by 225 ha, a 66% increase from 340 ha to 565 ha.
5. Citrus plantings increased by 170 ha, a 4% increase from 3,850 ha to 4,020 ha.
6. Carrot crops decreased by 175 ha, a 12% decrease from 1,515 ha to 1,340 ha.
7. Potato crops increased by 95 ha, a 5% increase from 1,740 ha to 1,835 ha.



Crop type		2018 ha	2019 ha	% of 2019 total	Change (ha) 2018 to 2019	% Change 2018 to 2019
Permanent	Grape Dried	1,280	1,250	2%	-30	-2%
	Grape Table	3,375	3,705	6%	+330	+10%
	Grape Wine	5,170	5,445	9%	+275	+5%
	Citrus	3,850	4,020	6%	+170	+4%
	Fruit Olive	3,665	3,655	6%	-10	-<1%
	Fruit Other	1,465	1,540	2%	+75	+5%
	Nut Almond	24,295	25,520	40%	+1,225	+5%
	Nut Other	340	565	1%	+225	+66%
	Other	385	410	1%	+25	+6%
Seasonal	Field Crop	4,455	4,480	7%	+25	+1%
	Veg. Carrot	1,515	1,340	2%	-175	-12%
	Veg. Potato	1,740	1,835	3%	+95	+5%
	Veg. Other	1,990	1,900	3%	-90	-5%
	Vacant P	2,940	2,535	4%	-405	-14%
	Vacant S	5,045	5,770	9%	+725	+14%
Total		61,510	63,970	100%	+2,460	+4%

Figure 30: Private diverters - crop types from 2018 to 2019

3.1.2 Private diverters summary - planting trends

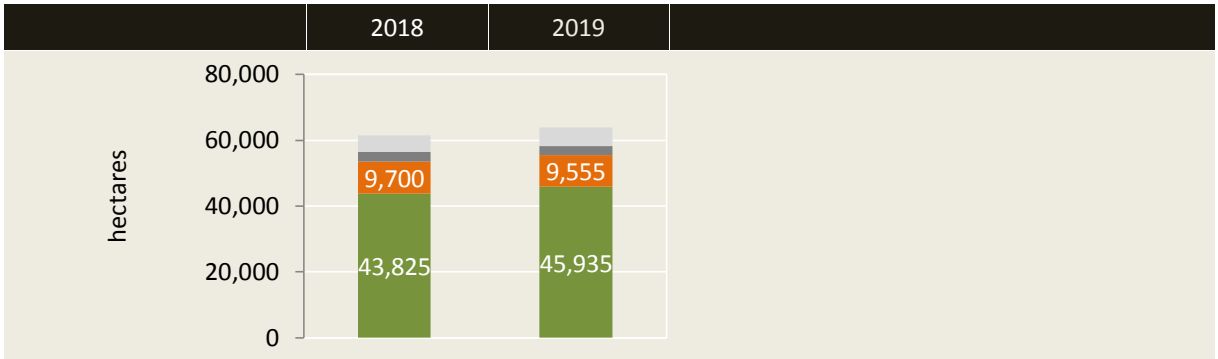
Figure 31 summarises planting trends of private diverters 2018 to 2019.

The proportion of permanent plantings, seasonal cropping and vacant areas changed from:

- 71% permanent, 16% seasonal and 13% vacant in 2018; to
- 72% permanent, 15% seasonal and 13% vacant in 2019.

From 2018 to 2019:

- Permanent plantings increased by 2,285 ha; a 5% increase from 43,825 ha to 46,110 ha.
- Seasonal cropping decreased by 145 ha; a 1% decrease from 9,700 ha to 9,555 ha.
- Vacant areas, previously permanent plantings, decreased by 405 ha; a 14% decrease from 2,940 ha to 2,535 ha.
- Vacant areas, previously seasonal crops, increased by 725 ha; a 14% increase from 5,045 ha to 5,770 ha.



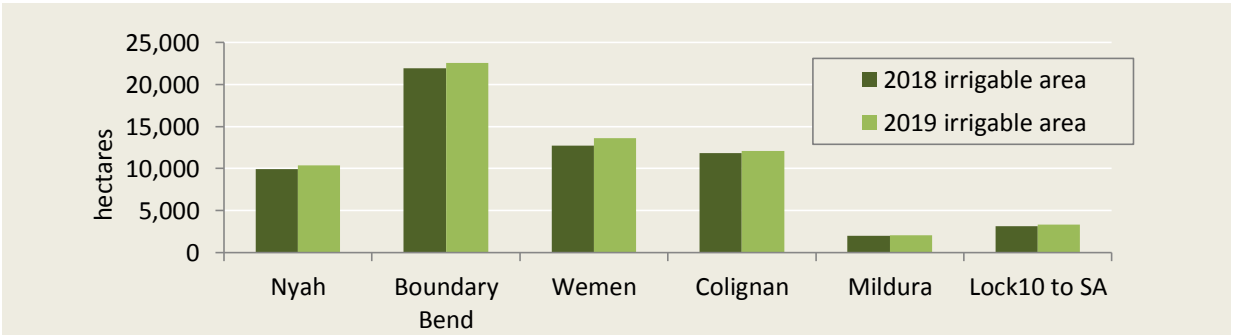
	2018	2019	% of 2019 total	Change (ha) 2018 to 2019	% Change 2018 to 2019
Permanent - irrigated	43,825	46,110	72%	+2,285	+5%
Seasonal - irrigated	9,700	9,555	15%	-145	-1%
Vacant - permanent	2,940	2,535	4%	-405	-14%
Vacant - seasonal	5,045	5,770	9%	+725	+14%
Total hectares	61,510	63,970	100%	+2,460	+4%
% Permanent	71%	72%			
% Seasonal	16%	15%			
% Vacant	13%	13%			

Figure 31: Private diverters - planting trends from 2018 to 2019

3.1.3 Private diverters summary - irrigation development

Figure 32 summarises irrigation development with respect to new development (expansion) and areas retired[8] from irrigation in the private diverter river reaches from 2018 to 2019.

- The irrigable area increased by 2,460 ha, a 4% increase from 61,510 ha in 2018 to 63,970 ha in 2019.
- The net increase of 2,460 ha was the balance of 2,480 ha of expansion and 20 ha retired from irrigation.
- Expansion occurred in all six river reaches. The largest growth areas from 2018 to 2019 were:
  - the Wemen river reach with a net increase in irrigable area of 895 ha; and
  - the Boundary Bend river reach with a net increase in irrigable area of 650 ha.



River reach	2018 (ha)	2018 to 2019		2019 (ha)	Change 2018-2019	Growth 2018-2019
		Retired	New			
Nyah	9,945	-5	470	10,410	+465	+5%
Boundary Bend	21,915	-10	660	22,565	+650	+3%
Wemen	12,700	0	895	13,595	+895	+7%
Colignan	11,825	0	270	12,095	+270	+2%
Mildura	1,970	-5	55	2,020	+50	+3%
Lock10 to Sth. Aus.	3,155	0	130	3,285	+130	+4%
Total	61,510	-20	2,480	63,970	+2,460	+4%

Figure 32: Private diverters - irrigation development from 2018 to 2019

[8] Retired areas have undergone a change in land use that precludes use for irrigation e.g. urban development, housing, sheds, dams and land set aside for conservation purposes.

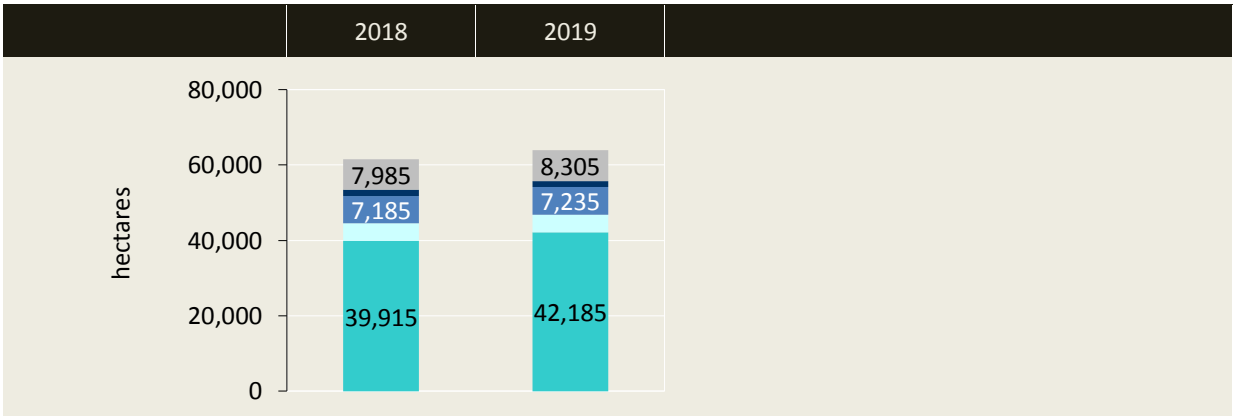
3.1.4 Private diverters summary - irrigation methods

Figure 33 summarises the change in irrigation methods for Murray River private diverters in the Vic. Murray-Mallee from 2018 to 2019.

Drippers remained the dominant irrigation method in 2018 and 2019.

From 2018 to 2019:

- Drip irrigation increased by 2,270 ha, a 6% increase from 39,915 ha to 42,185 ha.
- Lowlevel irrigation increased by 30 ha, a 1% increase from 4,655 ha to 4,685 ha.
- Overhead irrigation increased by 50 ha, a 1% increase from 7,185 ha to 7,235 ha.
- Furrow irrigation decreased by 210 ha, a 12% decrease from 1,770 ha to 1,560 ha.



Irrigation method	2018	2019	% of 2019 total	Change (ha) 2018 to 2019	% Change 2018 to 2019
Drip	39,915	42,185	66%	+2,270	+6%
Low level	4,655	4,685	7%	+30	+1%
Overhead	7,185	7,235	11%	+50	+1%
Furrow, flood	1,770	1,560	2%	-210	-12%
Vacant	7,985	8,305	13%	+320	+4%
Total hectares	61,510	63,970	100%	+2,460	+4%

Figure 33: Private diverters - irrigation methods from 2018 to 2019

3.1.5 Private diverters summary - salinity impact zones

Figure 34 summarises the irrigable area in each salinity impact zone across the private diverter river reaches from 2018 to 2019.

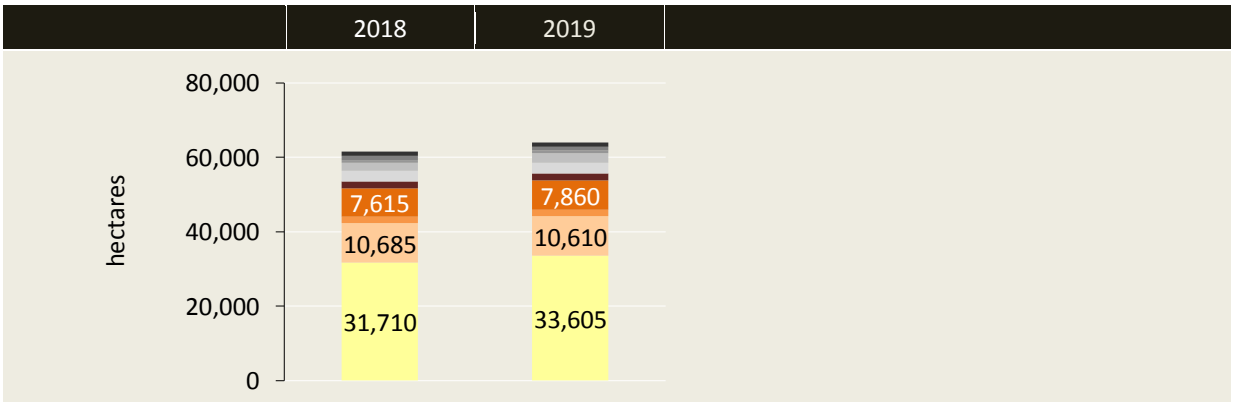
The dominant salinity impact zone was the lowest salinity impact zone, L1, in 2018 and 2019.

From 2018 to 2019, the area irrigated in:

- L1 increased by 1,895 ha, a 6% increase from 31,705 ha to 33,605 ha.
- L2 to L4 increased by 245 ha, a 1% increase from 19,950 ha to 20,195 ha.
- HIZ remained at 1,865 ha in 2018 and 2019.

From 2018 to 2019, the irrigable area in:

- L1 increased by 2,045 ha, a 6% increase from 34,520 ha to 36,565 ha.
- L2 to L4 increased by 420 ha, a 2% increase from 24,015 ha to 24,435 ha.
- HIZ decreased by 5 ha (retired areas), a less than 1% decrease from 2,975 ha to 2,970 ha.



Salinity impact zone		2018	2019	% of 2019 total	Change (ha) 2018 to 2019	% Change 2018 to 2019
Irrigated	L1	31,710	33,605	53%	+1,895	+6%
	L2	10,685	10,610	17%	-75	-1%
	L3	1,650	1,725	3%	+75	+5%
	L4	7,615	7,860	12%	+245	+3%
	HIZ	1,865	1,865	3%	0	0%
Not Irrigated	L1	2,810	2,960	5%	+150	+5%
	L2	2,190	2,465	4%	+275	+13%
	L3	805	805	1%	0	0%
	L4	1,070	970	2%	-100	-9%
	HIZ	1,110	1,105	2%	-5	-<1%
Total (ha)		61,510	63,970	100%	+2,460	+4%

Figure 34: Private diverters - irrigable area in each salinity impact zone from 2018 to 2019

3.2 Nyah river reach (Woorinen to the Wakool junction)

In summary for the Nyah river reach

Change in crop types from 2018 to 2019

Almond trees were the dominant crop in 2018 and 2019. The main changes from 2018 to 2019 were:

- Field crops decreased by 260 ha, an 11% decrease from 2,360 ha to 2,100 ha.
- Almond plantings increased by 210 ha, a 7% increase from 2,935 ha to 3,145 ha.
- Wine grape plantings increased by 160 ha, an 18% increase from 885 ha to 1,045 ha.
- Vegetables other than carrots and potatoes decreased by 135 ha, a 57% decrease from 235 ha to 100 ha.
- Other nut trees, pistachios, increased by 120 ha, from 0 to 120 ha.

Planting trends - permanent plantings, seasonal crops and vacant areas

From 2018 to 2019:

- Permanent plantings increased by 505 ha; a 10% increase from 4,955 ha to 5,460 ha.
- Seasonal cropping decreased by 375 ha; a 14% decrease from 2,695 ha to 2,320 ha.
- Vacant areas, previously permanent plantings, decreased by 55 ha; an 18% decrease from 300 ha to 245 ha.
- Vacant areas, previously seasonal crops, increased by 390 ha; a 20% increase from 1,995 ha to 2,385 ha.

Irrigation development - new and retired areas

The irrigable area in the Nyah river reach increased by 465 ha; a 5% increase from 9,945 ha in 2018 to 10,410 ha in 2019. The net increase of 465 ha was the balance of 470 ha expansion and 5 ha retired from irrigation.

Irrigation methods 2018 to 2019

Drippers remained the dominant irrigation method in 2018 and 2019. From 2018 to 2019:

- Drip irrigation increased by 490 ha, a 10% increase from 5,115 ha to 5,605 ha.
- Lowlevel irrigation decreased by 145 ha, a 42% decrease from 345 ha to 200 ha.
- Overhead irrigation increased by 15 ha, a 2% increase from 705 ha to 720 ha.
- Furrow irrigation decreased by 230 ha, a 15% decrease from 1,485 ha to 1,255 ha.

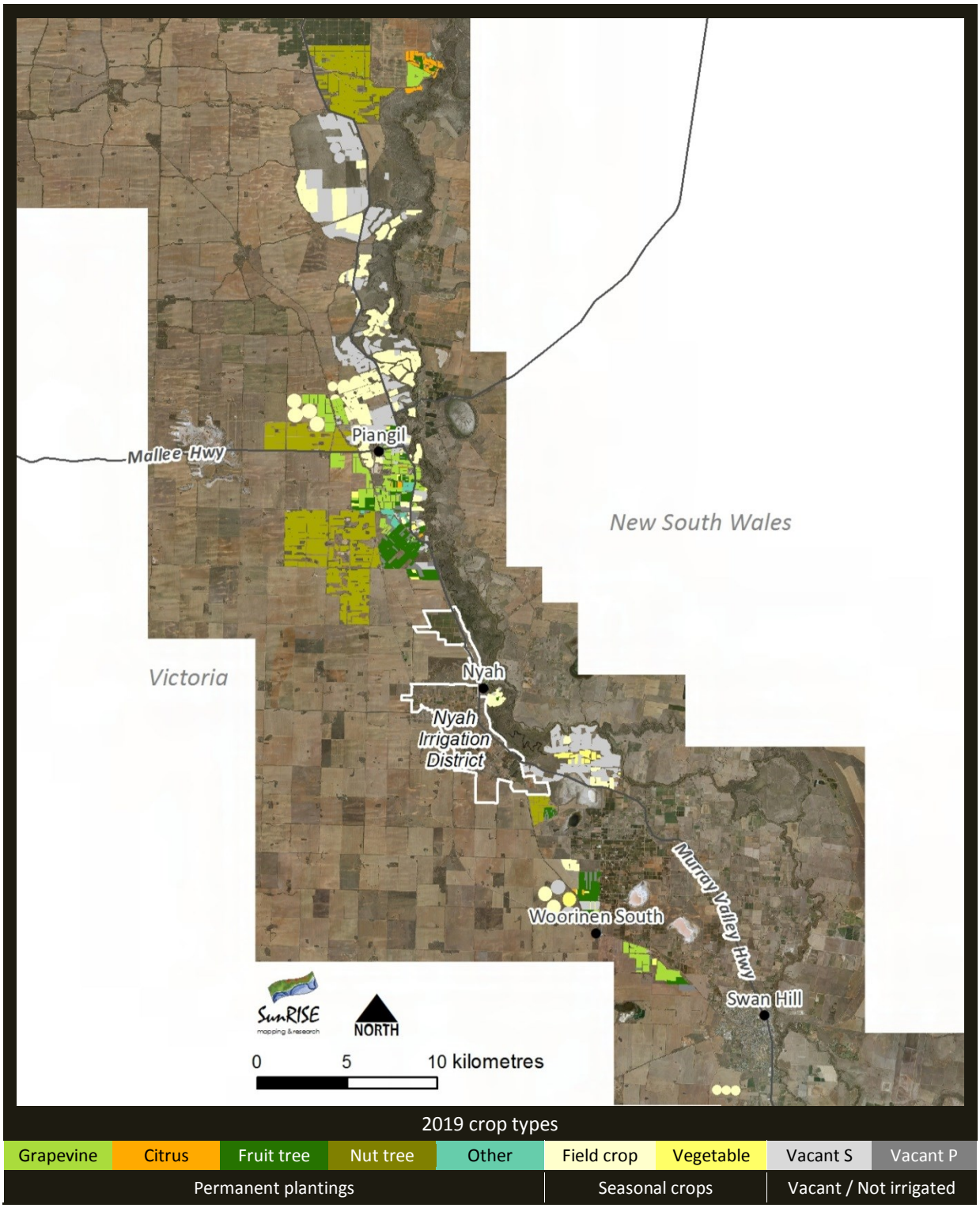
Salinity impact zones 2018 to 2019

The Nyah river reach is in the low salinity impact zones: L1, L2 and L3. From 2018 to 2019, the irrigable area in:

- L1 increased by 355 ha, a 6% increase from 6,405 ha to 6,760 ha.
- L2 increased by 110 ha, a 3% increase from 3,530 ha to 3,640 ha.
- L3 remained at 10 ha in 2018 and 2019.

3.2.1 Nyah river reach - crop types in 2019

Map 12 shows the Nyah river reach and crop types in 2019.



Map 12: Nyah river reach showing 2019 crop types

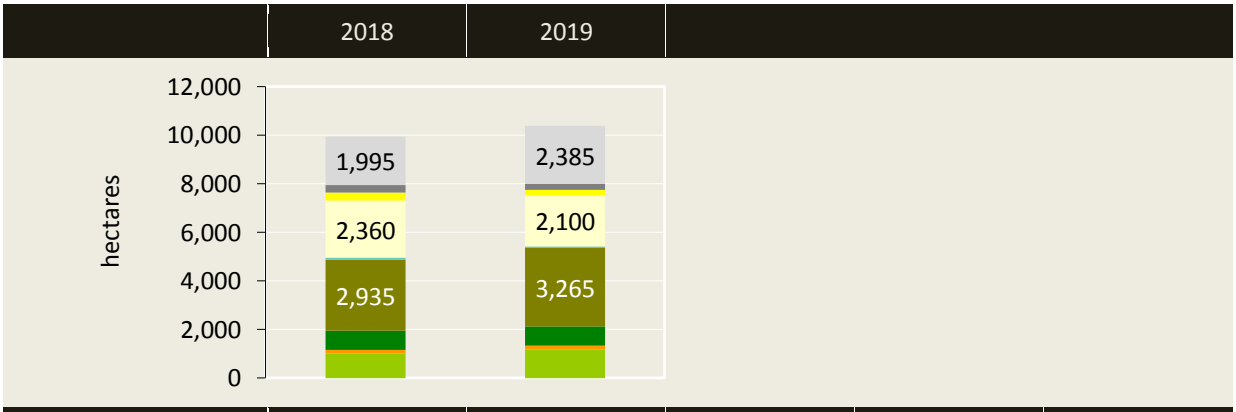
3.2.2 Nyah river reach - crop types from 2018 to 2019

Figure 35 summarises the change in irrigated crops in the Nyah river reach from 2018 to 2019.

Almond trees were the dominant crop in 2018 and 2019.

The main changes from 2018 to 2019 were:

1. Field crops decreased by 260 ha, an 11% decrease from 2,360 ha to 2,100 ha.
2. Almond plantings increased by 210 ha, a 7% increase from 2,935 ha to 3,145 ha.
3. Wine grape plantings increased by 160 ha, an 18% increase from 885 ha to 1,045 ha.
4. Vegetables other than carrots and potatoes decreased by 135 ha, a 57% decrease from 235 ha to 100 ha.
5. Other nut trees, pistachios, increased by 120 ha, from 0 to 120 ha.



Crop type		2018 ha	2019 ha	% of 2019 total	Change (ha) 2018 to 2019	% Change 2018 to 2019
Permanent	Grape Dried	-	-	-	-	-
	Grape Table	135	145	1%	+10	+7%
	Grape Wine	885	1,045	10%	+160	+18%
	Citrus	135	145	1%	+10	+7%
	Fruit Olive	5	5	<1%	0	0%
	Fruit Other	785	780	7%	-5	-1%
	Nut Almond	2,935	3,145	30%	+210	+7%
	Nut Other	0	120	1%	+120	
	Other	75	75	1%	0	0%
Seasonal	Field Crop	2,360	2,100	20%	-260	-11%
	Veg. Carrot	100	120	1%	+20	+20%
	Veg. Potato	-	-	-	-	-
	Veg. Other	235	100	1%	-135	-57%
	Vacant P	300	245	2%	-55	-18%
	Vacant S	1,995	2,385	23%	+390	+20%
Total		9,945	10,410	100%	+465	+5%

Figure 35: Nyah river reach - crop types from 2018 to 2019

3.2.3 Nyah river reach - planting trends

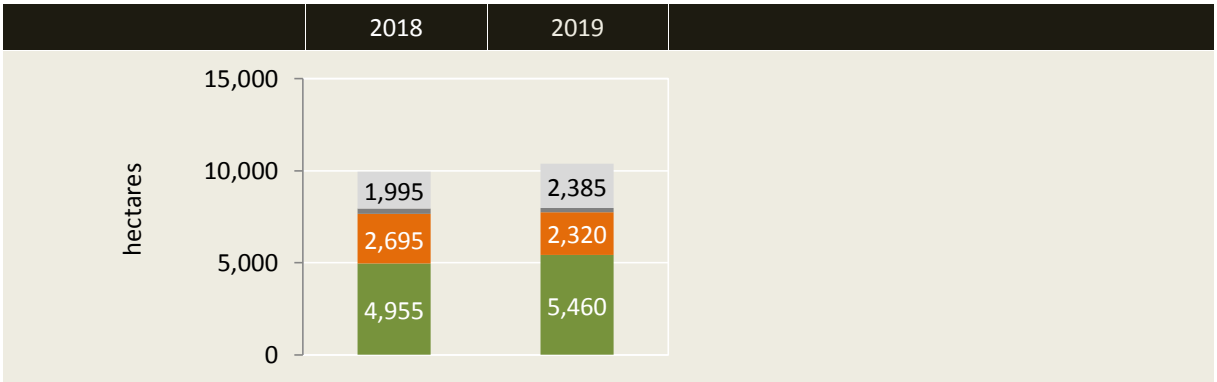
Figure 36 summarises planting trends in the Nyah river reach from 2018 to 2019.

The proportion of permanent plantings, seasonal cropping and vacant areas changed from:

- 50% permanent, 27% seasonal and 23% vacant in 2018; to
- 52% permanent, 23% seasonal and 25% vacant in 2019.

From 2018 to 2019:

- Permanent plantings increased by 505 ha; a 10% increase from 4,955 ha to 5,460 ha.
- Seasonal cropping decreased by 375 ha; a 14% decrease from 2,695 ha to 2,320 ha.
- Vacant areas, previously permanent plantings, decreased by 55 ha; an 18% decrease from 300 ha to 245 ha.
- Vacant areas, previously seasonal crops, increased by 390 ha; a 20% increase from 1,995 ha to 2,385 ha.



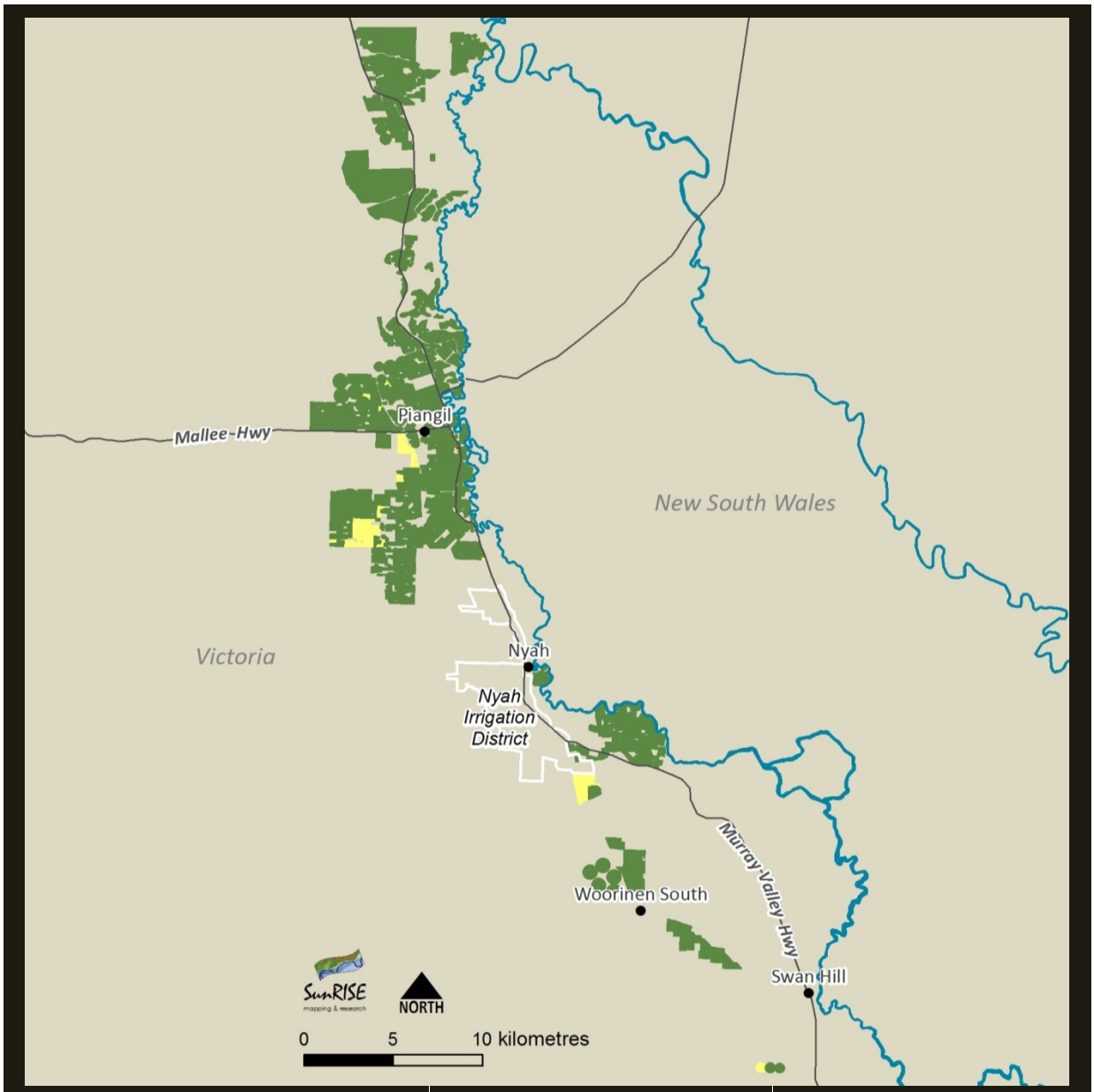
	2018	2019	% of 2019 total	Change (ha) 2018 to 2019	% Change 2018 to 2019
Permanent - irrigated	4,955	5,460	52%	+505	+10%
Seasonal - irrigated	2,695	2,320	23%	-375	-14%
Vacant - permanent	300	245	2%	-55	-18%
Vacant - seasonal	1,995	2,385	23%	+390	+20%
Total hectares	9,945	10,410	100%	+465	+5%
% Permanent	50%	52%			
% Seasonal	27%	23%			
% Vacant	23%	25%			

Figure 36: Nyah river reach - planting trends from 2018 to 2019

3.2.4 Nyah river reach - irrigation development

Map 13 shows irrigation development, from 2018 to 2019, in the Nyah river reach with respect to new development (expansion) and areas retired[9] from irrigation.

- The irrigable area increased by 465 ha; a 5% increase from 9,945 ha in 2018 to 10,410 ha in 2019.
- The net increase of 465 ha was the balance of 470 ha expansion and 5 ha retired from irrigation.



	Hectares		% Change
Irrigation areas in 2018 (2017-18 season)	9,945		
Retired between 2018 and 2019	-5		-<1%
Expansion between 2018 and 2019	+470		+5%
Irrigation areas in 2019 (2018-19 season)	10,410		

Map 13: Nyah river reach - irrigation development from 2018 to 2019

[9] Retired areas have undergone a change in land use that precludes use for irrigation e.g. urban development, housing, sheds, dams and land set aside for conservation purposes.

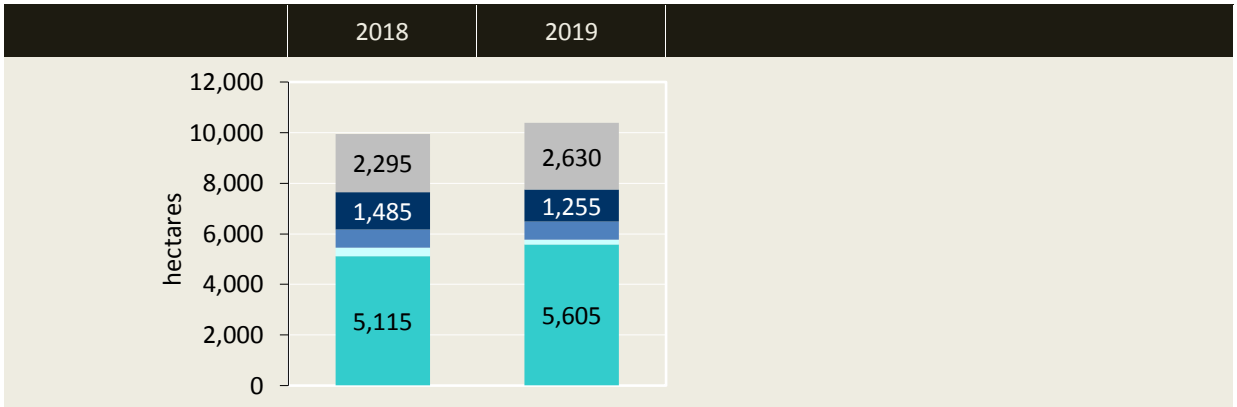
3.2.5 Nyah river reach - irrigation methods

Figure 37 summarises the change in irrigation methods in the Nyah river reach from 2018 to 2019.

Drippers remained the dominant irrigation method in 2018 and 2019.

From 2018 to 2019:

- Drip irrigation increased by 490 ha, a 10% increase from 5,115 ha to 5,605 ha.
- Lowlevel irrigation decreased by 145 ha, a 42% decrease from 345 ha to 200 ha.
- Overhead irrigation increased by 15 ha, a 2% increase from 705 ha to 720 ha.
- Furrow irrigation decreased by 230 ha, a 15% decrease from 1,485 ha to 1,255 ha.



Irrigation method	2018	2019	% of 2019 total	Change (ha) 2018 to 2019	% Change 2018 to 2019
Drip	5,115	5,605	54%	+490	+10%
Low level	345	200	2%	-145	-42%
Overhead	705	720	7%	+15	+2%
Furrow, flood	1,485	1,255	12%	-230	-15%
Vacant	2,295	2,630	25%	+335	+15%
Total hectares	9,945	10,410	100%	+465	+5%

Figure 37: Nyah river reach - irrigation methods from 2018 to 2019

3.2.6 Nyah river reach - salinity impact zones

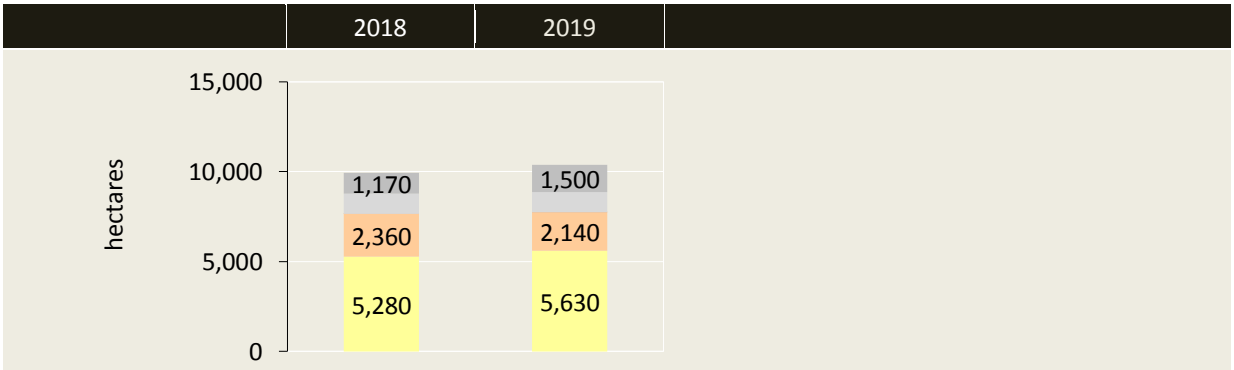
Figure 38 summarises the irrigable area in each salinity impact zone in the Nyah river reach from 2018 to 2019. Nyah private diverters are in low salinity impact zones L1, L2 and L3. There are no high salinity impact zones.

From 2018 to 2019, the area irrigated in:

- L1 increased by 350 ha, a 7% increase from 5,280 ha to 5,630 ha.
- L2 decreased by 220 ha, a 9% decrease from 2,360 ha to 2,140 ha.
- L3 remained at 10 ha in 2018 and 2019.

From 2018 to 2019, the irrigable area in:

- L1 increased by 355 ha, a 6% increase from 6,405 ha to 6,760 ha.
- L2 increased by 110 ha, a 3% increase from 3,530 ha to 3,640 ha.
- L3 remained at 10 ha in 2018 and 2019.



Salinity impact zone		2018	2019	% of 2019 total	Change (ha) 2018 to 2019	% Change 2018 to 2019
Irrigated	L1	5,280	5,630	54%	+350	+7%
	L2	2,360	2,140	21%	-220	-9%
	L3	10	10	<1%	0	0%
	L4	-	-	-	-	-
	HIZ	-	-	-	-	-
Not Irrigated	L1	1,125	1,130	11%	+5	+<1%
	L2	1,170	1,500	14%	+330	+28%
	L3	-	-	-	-	-
	L4	-	-	-	-	-
	HIZ	-	-	-	-	-
Total (ha)		9,945	10,410	100%	+465	+5%

Figure 38: Nyah river reach - irrigable area in each salinity impact zone from 2018 to 2019

3.3 Boundary Bend river reach (*Wakool to Euston weir*)

In summary for the Boundary Bend river reach

Change in crop types from 2018 to 2019

Almond trees were the dominant crop in 2018 and 2019. The main changes from 2018 to 2019 were:

1. Field crops increased by 250 ha, a 23% increase from 1,090 ha to 1,340 ha.
2. Almond plantings increased by 130 ha, a 1% increase from 11,040 ha to 11,170 ha.
3. Potato crops increased by 95 ha, a 5% increase from 1,740 ha to 1,835 ha.
4. Table grape plantings increased by 75 ha, a 5% increase from 1,605 ha to 1,680 ha.
5. Carrot crops decreased by 65 ha, a 100% decrease from 65 to 0 ha.
6. Vegetables other than carrots and potatoes decreased by 60 ha, a 41% decrease from 145 ha to 85 ha.

Planting trends - permanent plantings, seasonal crops and vacant areas

From 2018 to 2019:

- Permanent plantings increased by 260 ha; a 2% increase from 16,635 ha to 16,895 ha.
- Seasonal cropping increased by 220 ha; a 7% increase from 3,040 ha to 3,260 ha.
- Vacant areas, previously permanent plantings, decreased by 220 ha; a 20% decrease from 1,090 ha to 870 ha.
- Vacant areas, previously seasonal crops, increased by 390 ha; a 34% increase from 1,150 ha to 1,540 ha.

Irrigation development - new and retired areas

The irrigable area in the Boundary Bend river reach increased by 650 ha, a 3% increase from 21,915 ha in 2018 to 22,565 ha in 2018. The net increase of 650 ha was the balance of 660 ha expansion and 10 ha retired from irrigation.

Irrigation methods 2018 to 2019

Drippers remained the dominant irrigation method in 2018 and 2019. From 2018 to 2019:

- Drip irrigation increased by 220 ha, a 1% increase from 15,665 ha to 15,885 ha.
- Lowlevel irrigation increased by 120 ha, a 14% increase from 880 ha to 1,000 ha.
- Overhead and pivot irrigation increased by 150 ha, a 5% increase from 3,055 ha to 3,205 ha.
- Furrow irrigation decreased by 10 ha, a 13% decrease from 75 ha to 65 ha.

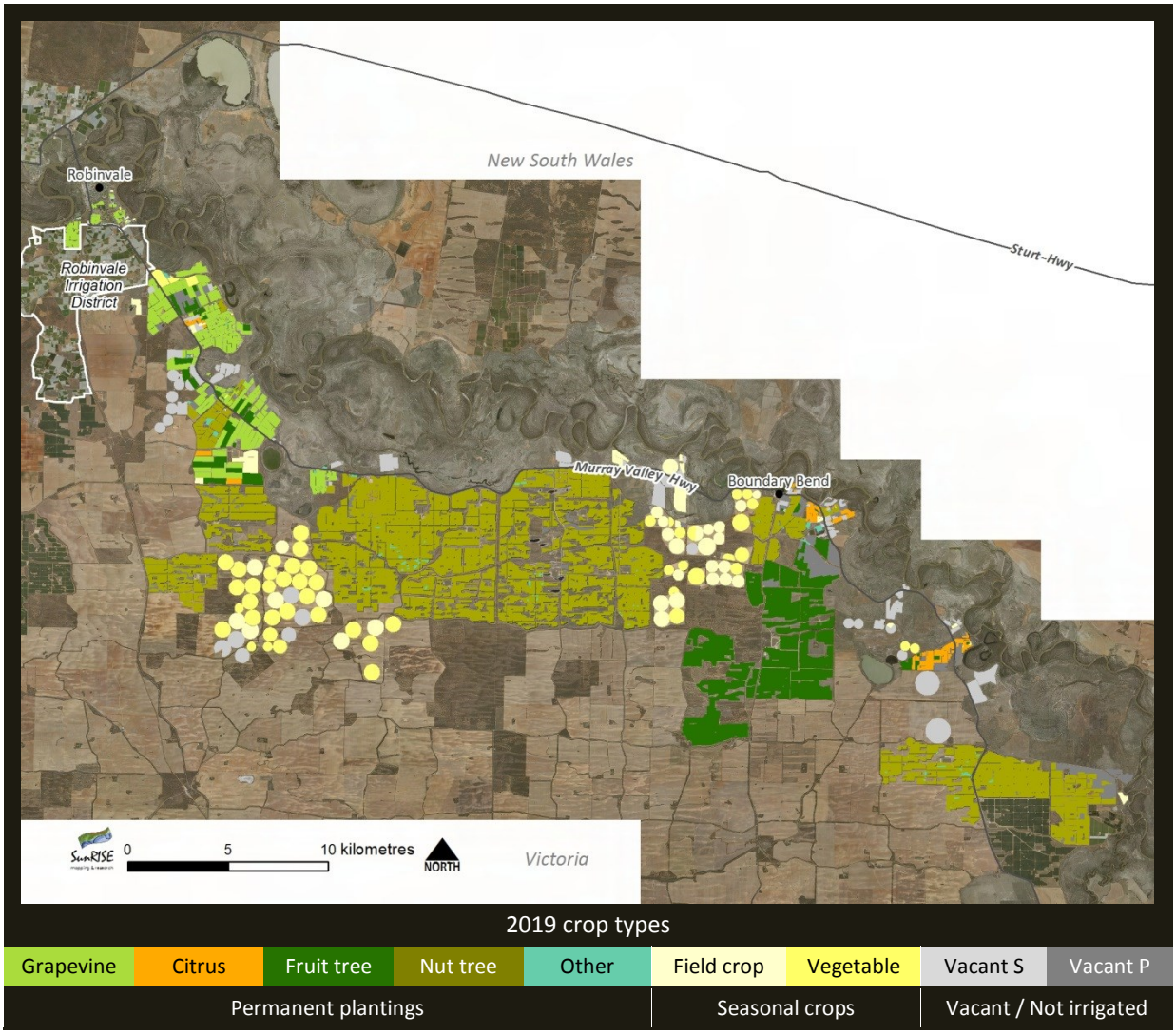
Salinity impact zones 2018 to 2019

The Boundary Bend river reach is in the low salinity impact zones: L1, L2 and L3. From 2018 to 2019 the irrigable area in:

- L1 increased by 600 ha, a 3% increase from 17,820 ha to 18,420 ha.
- L2 decreased by 5 ha, a less than 1% decrease from 1,775 ha to 1,770 ha; and
- L3 increased by 55 ha, a 2% increase from 2,320 ha to 2,375 ha.

3.3.1 Boundary Bend river reach - crop types in 2019

Map 14 shows the Boundary Bend river reach and crop types in 2019.



Map 14: Boundary Bend river reach showing 2019 crop types

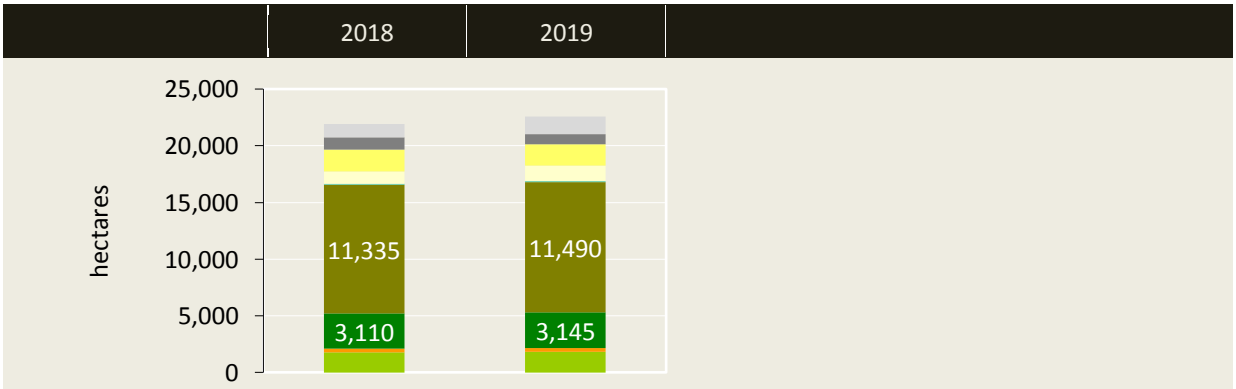
3.3.2 Boundary Bend river reach - crop types from 2018 to 2019

Figure 39 summarises the change in irrigated crops in the Boundary Bend river reach from 2018 to 2019.

Almond trees were the dominant crop in 2018 and 2019.

The main changes from 2018 to 2019 were:

1. Field crops increased by 250 ha, a 23% increase from 1,090 ha to 1,340 ha.
2. Almond plantings increased by 130 ha, a 1% increase from 11,040 ha to 11,170 ha.
3. Potato crops increased by 95 ha, a 5% increase from 1,740 ha to 1,835 ha.
4. Table grape plantings increased by 75 ha, a 5% increase from 1,605 ha to 1,680 ha.
5. Carrot crops decreased by 65 ha, a 100% decrease from 65 to 0 ha.
6. Vegetables other than carrots and potatoes decreased by 60 ha, a 41% decrease from 145 ha to 85 ha.



Crop type		2018 ha	2019 ha	% of 2019 total	Change (ha) 2018 to 2019	% Change 2018 to 2019
Permanent	Grape Dried	-	-	-	-	-
	Grape Table	1,605	1,680	7%	+75	+5%
	Grape Wine	190	160	1%	-30	-16%
	Citrus	305	330	1%	+25	+8%
	Fruit Olive	2,785	2,770	12%	-15	-1%
	Fruit Other	325	375	2%	+50	+15%
	Nut Almond	11,040	11,170	50%	+130	+1%
	Nut Other	295	320	1%	+25	+8%
	Other	90	90	<1%	0	0%
Seasonal	Field Crop	1,090	1,340	6%	+250	+23%
	Veg. Carrot	65	0	0%	-65	-100%
	Veg. Potato	1,740	1,835	8%	+95	+5%
	Veg. Other	145	85	<1%	-60	-41%
	Vacant P	1,090	870	4%	-220	-20%
	Vacant S	1,150	1,540	7%	+390	+34%
Total		21,915	22,565	100%	+650	+3%

Figure 39: Boundary Bend river reach - crop types from 2018 to 2019

3.3.3 Boundary Bend river reach - planting trends

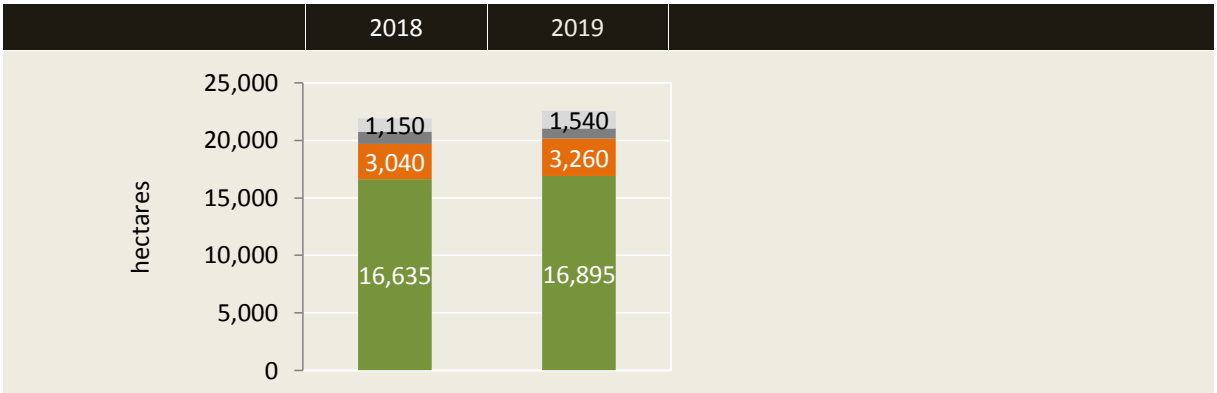
Figure 40 summarises planting trends in the Boundary Bend river reach from 2018 to 2019.

The proportion of permanent plantings, seasonal cropping and vacant areas changed from:

- 76% permanent, 14% seasonal and 10% vacant in 2018; to
- 75% permanent, 14% seasonal and 11% vacant in 2019.

From 2018 to 2019:

- Permanent plantings increased by 260 ha; a 2% increase from 16,635 ha to 16,895 ha.
- Seasonal cropping increased by 220 ha; a 7% increase from 3,040 ha to 3,260 ha.
- Vacant areas, previously permanent plantings, decreased by 220 ha; a 20% decrease from 1,090 ha to 870 ha.
- Vacant areas, previously seasonal crops, increased by 390 ha; a 34% increase from 1,150 ha to 1,540 ha.



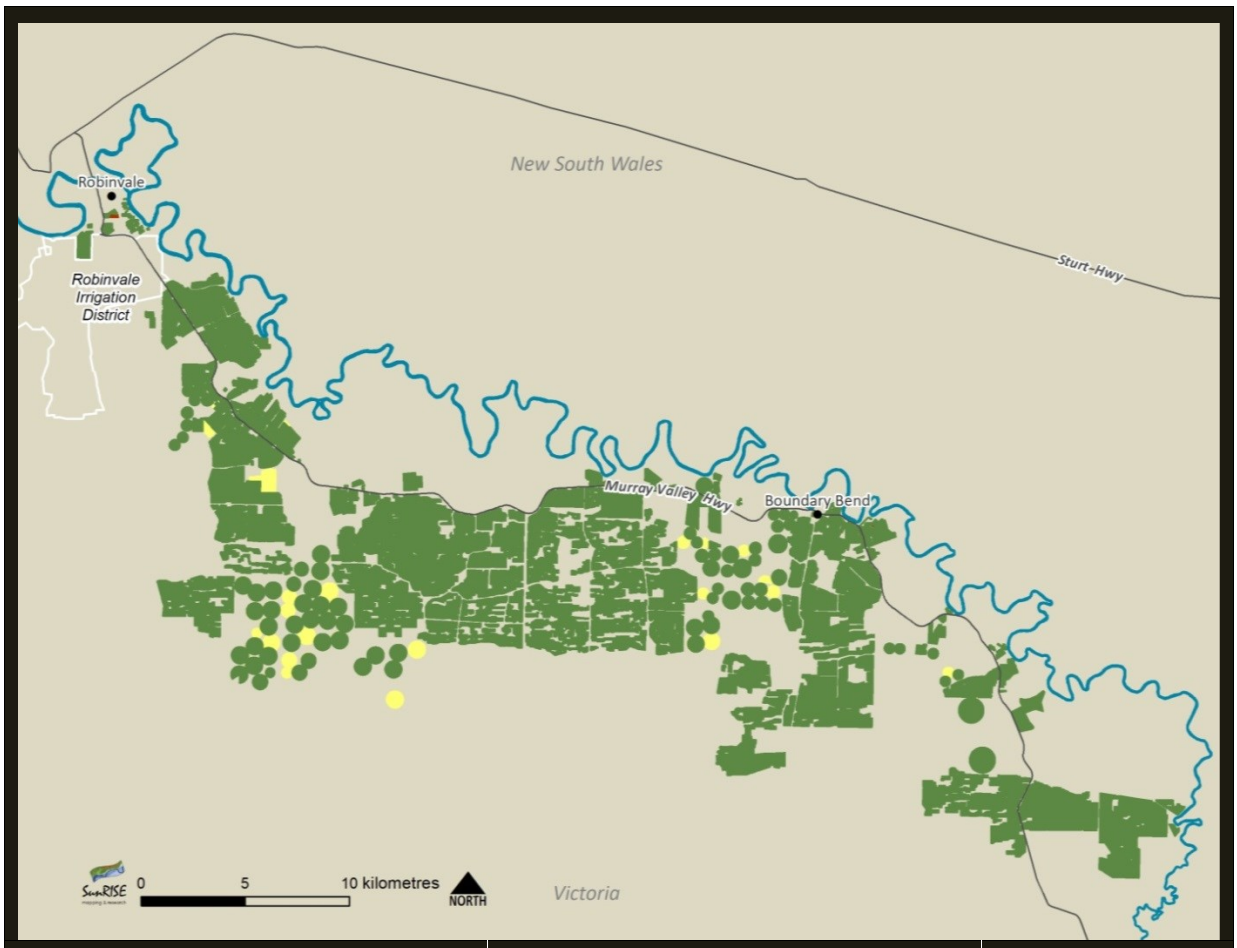
	2018	2019	% of 2019 total	Change (ha) 2018 to 2019	% Change 2018 to 2019
Permanent - irrigated	16,635	16,895	75%	+260	+2%
Seasonal - irrigated	3,040	3,260	14%	+220	+7%
Vacant - permanent	1,090	1,015	4%	-220	-20%
Vacant - seasonal	1,150	1,540	7%	+390	+34%
Total hectares	21,915	22,565	100%	+650	+3%
% Permanent	76%	75%			
% Seasonal	14%	14%			
% Vacant	10%	11%			

Figure 40: Boundary Bend river reach - planting trends from 2018 to 2019

3.3.4 Boundary Bend river reach - irrigation development

Map 15 shows irrigation development from 2018 to 2019 in the Boundary Bend river reach with respect to new development (expansion) and areas retired[10] from irrigation.

- The irrigable area increased by 650 ha, a 3% increase from 21,915 ha in 2018 to 22,565 ha in 2018.
- The net increase of 650 ha was the balance of 10 ha retired from irrigation and 660 ha of expansion.



	Hectares		% Change
Irrigation areas in 2018 (2017-18 season)	21,915		
Retired between 2018 and 2019	-10		-<1%
Expansion between 2018 and 2019	+660		+3%
Irrigation areas in 2019 (2018-19 season)	22,565		

Map 15: Boundary Bend river reach - irrigation development from 2018 to 2019

[10] Retired areas have undergone a change in land use that precludes use for irrigation e.g. urban development, housing, sheds, dams and land set aside for conservation purposes.

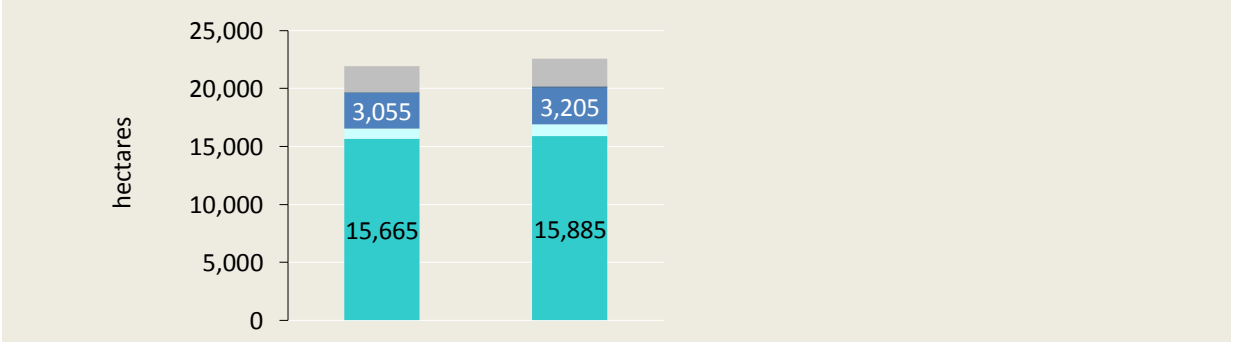
3.3.5 Boundary Bend river reach - irrigation methods

Figure 41 summarises the change in irrigation methods in the Boundary Bend river reach from 2018 to 2019.

Drippers remained the dominant irrigation method in 2018 and 2019.

From 2018 to 2019:

- Drip irrigation increased by 220 ha, a 1% increase from 15,665 ha to 15,885 ha.
- Lowlevel irrigation increased by 120 ha, a 14% increase from 880 ha to 1,000 ha.
- Overhead and pivot irrigation increased by 150 ha, a 5% increase from 3,055 ha to 3,205 ha.
- Furrow irrigation decreased by 10 ha, a 13% decrease from 75 ha to 65 ha.



Irrigation method	2018	2019	% of 2019 total	Change (ha) 2018 to 2019	% Change 2018 to 2019
Drip	15,665	15,885	70%	+220	+1%
Low level	880	1,000	4%	+120	+14%
Overhead	3,055	3,205	14%	+150	+5%
Furrow, flood	75	65	<1%	-10	-13%
Vacant	2,240	2,410	11%	+170	+8%
Total hectares	21,915	22,565	100%	+650	+3%

Figure 41: Boundary Bend river reach - irrigation methods from 2018 to 2019

3.3.6 Boundary Bend river reach - salinity impact zones

Figure 42 summarises the irrigable area in each salinity impact zone in the Boundary Bend river reach from 2018 to 2019.

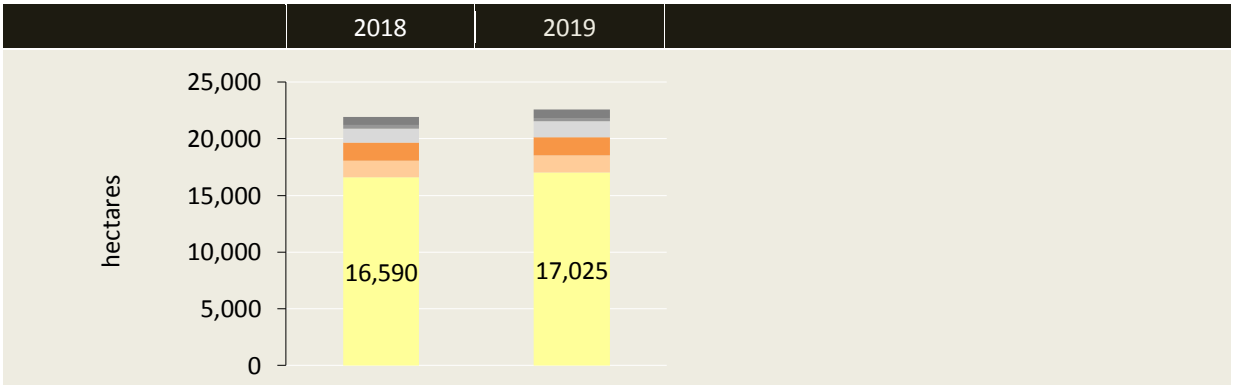
Boundary Bend private diverters are in low salinity impact zones L1, L2 and L3. There are no high salinity impact zones.

From 2018 to 2019, the area irrigated in:

- L1 increased by 435 ha, a 3% increase from 16,590 ha to 17,025 ha.
- L2 increased by 25 ha, a 2% increase from 1,460 ha to 1,485 ha.
- L3 increased by 20 ha, a 1% increase from 1,625 ha to 1,645 ha.

From 2018 to 2019, the irrigable area in:

- L1 increased by 600 ha, a 3% increase from 17,820 ha to 18,420 ha.
- L2 decreased by 5 ha, a less than 1% decrease from 1,775 ha to 1,770 ha; and
- L3 increased by 55 ha, a 2% increase from 2,320 ha to 2,375 ha.



Salinity impact zone		2018	2019	% of 2019 total	Change (ha) 2018 to 2019	% Change 2018 to 2019
Irrigated	L1	16,590	17,025	75%	+435	+3%
	L2	1,460	1,485	7%	+25	+2%
	L3	1,625	1,645	7%	+20	+1%
	L4	-	-	-	-	-
	HIZ	-	-	-	-	-
Not Irrigated	L1	1,230	1,395	6%	+165	+13%
	L2	315	285	1%	-30	-10%
	L3	695	730	3%	+35	+5%
	L4	-	-	-	-	-
	HIZ	-	-	-	-	-
Total (ha)		21,915	22,565	100%	+650	+3%

Figure 42: Boundary Bend river reach - irrigable area in each salinity impact zone from 2018 to 2019

3.4 Wemen river reach (Euston weir to Liparoo)

In summary for the Wemen river reach

Change in crop types from 2018 to 2019

Almond trees were the dominant crop in 2018 and 2019. The main changes from 2018 to 2019 were:

1. Almond tree plantings increased by 740 ha, a 10% increase from 7,475 ha to 8,215 ha.
2. Table grape plantings increased by 165 ha, a 52% increase from 320 ha to 485 ha.
3. Carrot crops decreased by 130 ha, a 10% decrease from 1,350 ha to 1,220 ha.
4. Vegetables other than carrots and potatoes increased by 115 ha, a 10% increase from 1,130 ha to 1,245 ha.
5. Other nut trees, pistachios, increased by 80 ha, a 533% increase from 15 ha to 95 ha.

Planting trends - permanent plantings, seasonal crops and vacant areas

From 2018 to 2019:

- Permanent plantings increased by 980 ha; a 10% increase from 9,365 ha to 10,345 ha.
- Seasonal cropping decreased by 25 ha; a 1% decrease from 2,500 ha to 2,475 ha.
- Vacant areas, previously permanent plantings, decreased by 45 ha; a 22% decrease from 205 ha to 160 ha.
- Vacant areas, previously seasonal crops, decreased by 15 ha; a 2% decrease from 630 ha to 615 ha.

Irrigation development - new and retired areas

The irrigable area in the Wemen river reach increased by 895 ha, a 7% increase from 12,700 ha in 2018 to 13,595 ha in 2019. The increase of 895 ha was expansion, there were no areas retired.

Irrigation methods 2018 to 2019

Drippers remained the dominant irrigation method in 2018 and 2019. From 2018 to 2019:

- Drip irrigation increased by 1,035 ha, a 12% increase from 8,980 ha to 10,015 ha.
- Lowlevel irrigation decreased by 15 ha, a 1% decrease from 1,345 ha to 1,330 ha.
- Overhead irrigation decreased by 65 ha, a 4% decrease from 1,535 ha to 1,470 ha.
- Furrow irrigation remained at 5 ha in 2018 and 2019.

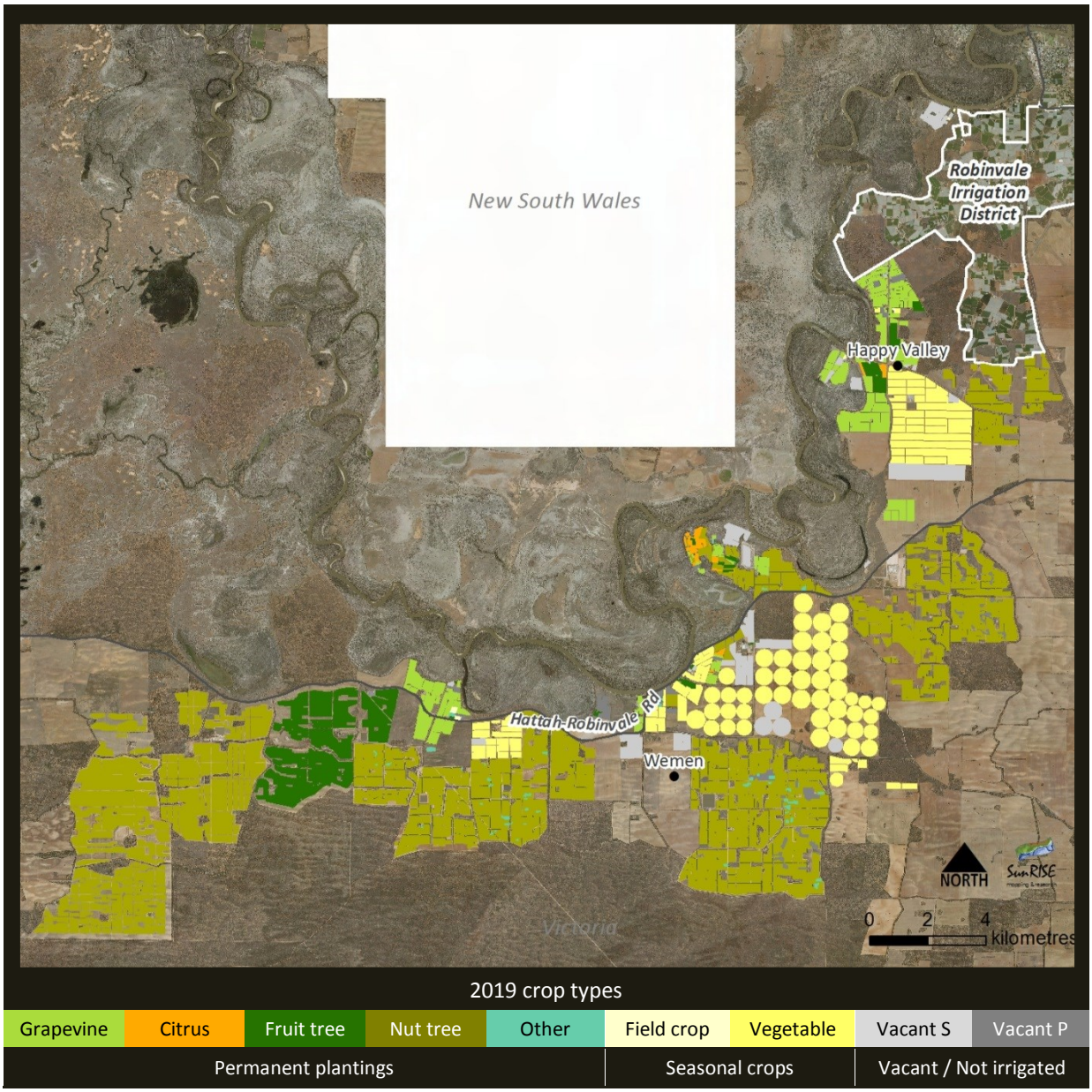
Salinity impact zones 2018 to 2019

The Wemen river reach is in the low salinity impact zones: L1, L2 and L3. From 2018 to 2019, the irrigable area in:

- L1 increased by 780 ha, a 16% increase from 5,005 ha to 5,785 ha.
- L2 increased by 95 ha, a 1% increase from 7,570 ha to 7,665 ha.
- L3 increased by 20 ha, a 16% increase from 125 ha to 145 ha.

3.4.1 Wemen river reach - crop types in 2019

Map 16 shows the Wemen river reach with crop types in 2019.



Map 16: Wemen river reach showing 2019 crop types

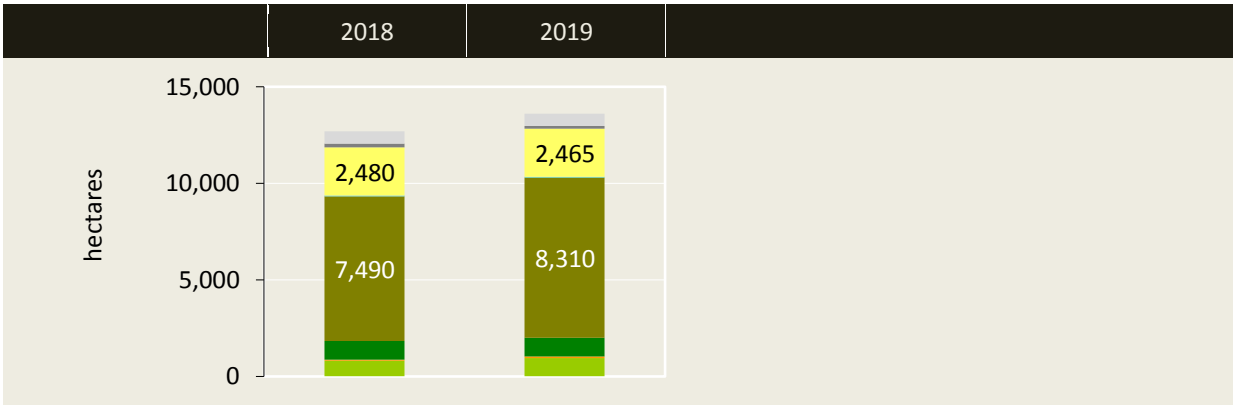
3.4.2 Wemen river reach - crop types from 2018 to 2019

Figure 43 summarises the change in irrigated crops in the Wemen river reach from 2018 to 2019.

Almond trees were the dominant crop in 2018 and 2019.

The main changes from 2018 to 2019 were:

1. Almond tree plantings increased by 740 ha, a 10% increase from 7,475 ha to 8,215 ha.
2. Table grape plantings increased by 165 ha, a 52% increase from 320 ha to 485 ha.
3. Carrot crops decreased by 130 ha, a 10% decrease from 1,350 ha to 1,220 ha.
4. Vegetables other than carrots and potatoes increased by 115 ha, a 10% increase from 1,130 ha to 1,245 ha.
5. Other nut trees, pistachios, increased by 80 ha, a 533% increase from 15 ha to 95 ha.



	Crop type	2018 ha	2019 ha	% of 2019 total	Change (ha) 2018 to 2019	% Change 2018 to 2019
Permanent	Grape Dried	120	115	1%	-5	-4%
	Grape Table	320	485	4%	+165	+52%
	Grape Wine	360	355	3%	-5	-1%
	Citrus	70	70	1%	0	0%
	Fruit Olive	855	855	6%	0	0%
	Fruit Other	105	110	1%	+5	+5%
	Nut Almond	7,475	8,215	60%	+740	+10%
	Nut Other	15	95	1%	+80	+533%
	Other	45	45	<1%	0	0%
Seasonal	Field Crop	20	10	<1%	-10	-50%
	Veg. Carrot	1,350	1,220	9%	-130	-10%
	Veg. Potato	-	-	-	-	-
	Veg. Other	1,130	1,245	9%	+115	+10%
	Vacant P	205	160	1%	-45	-22%
	Vacant S	630	615	5%	-15	-2%
Total		12,700	13,595	100%	+895	+7%

Figure 43: Wemen river reach - crop types from 2018 to 2019

3.4.3 Wemen river reach - planting trends

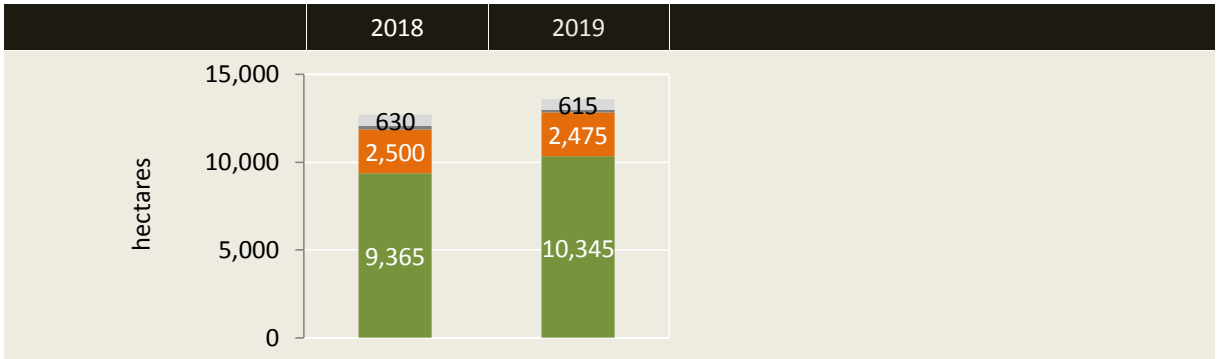
Figure 44 summarises planting trends in the Wemen river reach from 2018 to 2019.

The proportion of permanent plantings, seasonal cropping and vacant areas changed from:

- 74% permanent, 20% seasonal and 7% vacant in 2018; to
- 76% permanent, 18% seasonal and 6% vacant in 2019.

From 2018 to 2019:

- Permanent plantings increased by 980 ha; a 10% increase from 9,365 ha to 10,345 ha.
- Seasonal cropping decreased by 25 ha; a 1% decrease from 2,500 ha to 2,475 ha.
- Vacant areas, previously permanent plantings, decreased by 45 ha; a 22% decrease from 205 ha to 160 ha.
- Vacant areas, previously seasonal crops, decreased by 15 ha; a 2% decrease from 630 ha to 615 ha.



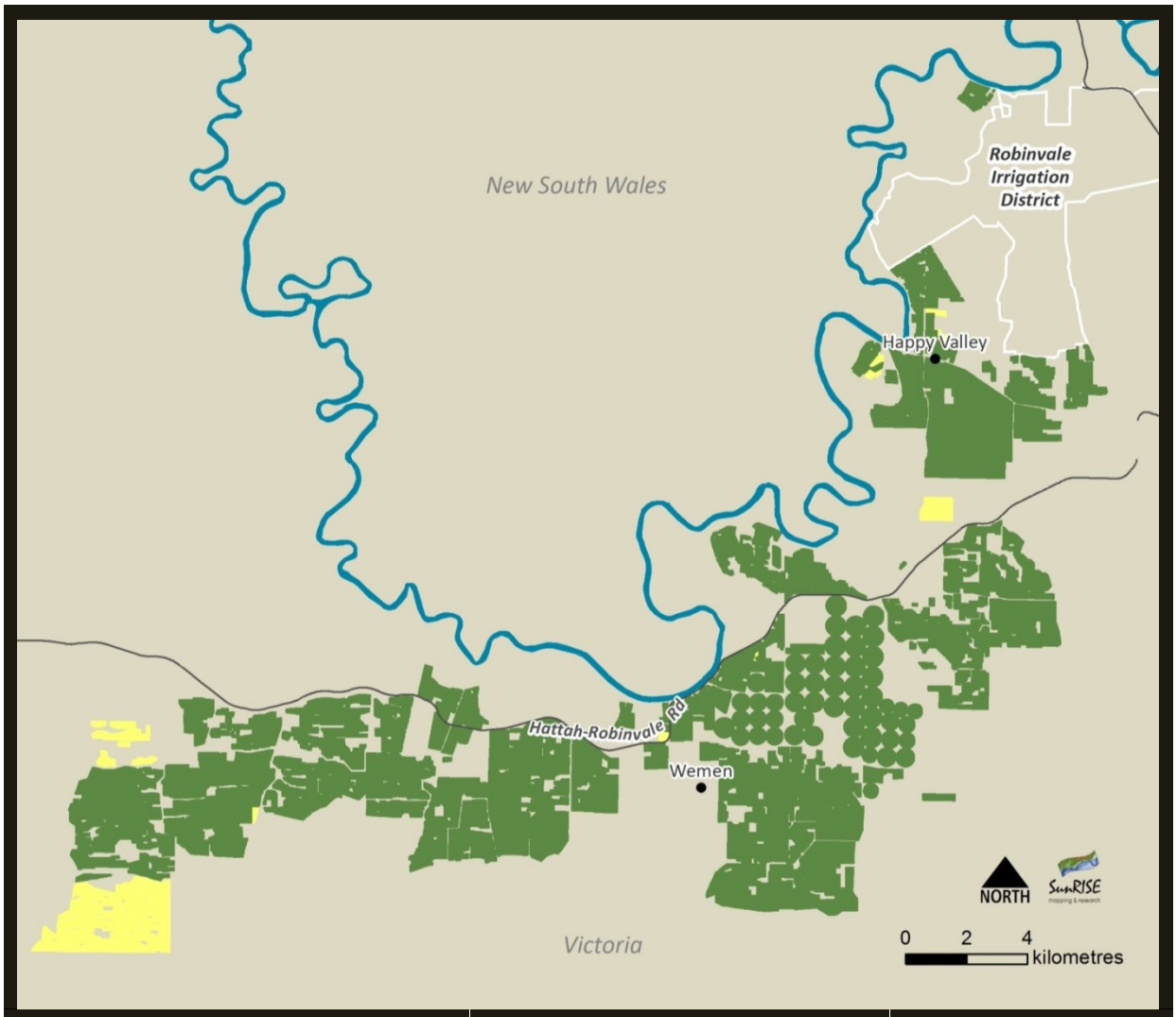
	2018	2019	% of 2019 total	Change (ha) 2018 to 2019	% Change 2018 to 2019
Permanent - irrigated	9,365	10,345	76%	+980	+10%
Seasonal - irrigated	2,500	2,475	18%	-25	-1%
Vacant - permanent	205	160	1%	-45	-22%
Vacant - seasonal	630	615	5%	-15	-2%
Total hectares	12,700	13,595	100%	+895	+7%
% Permanent	74%	76%			
% Seasonal	20%	18%			
% Vacant	7%	6%			

Figure 44: Wemen river reach - planting trends from 2018 to 2019

3.4.4 Wemen river reach - irrigation development

Map 17 shows irrigation development from 2018 to 2019 in the Wemen river reach with respect to new development (expansion) and areas retired[11] from irrigation.

- The irrigable area increased by 895 ha, a 7% increase from 12,700 ha in 2018 to 13,595 ha in 2019.
- The net increase of 895 ha comprised 0 ha retired from irrigation and 895 ha of expansion.



	Hectares		% Change
Irrigation areas in 2018 (2017-18 season)	12,700		
Retired between 2018 and 2019	0		0%
Expansion between 2018 and 2019	+895		+7%
Irrigation areas in 2019 (2018-19 season)	13,595		

Map 17: Wemen river reach - irrigation development from 2018 to 2019

[11] Retired areas have undergone a change in land use that precludes use for irrigation e.g. urban development, housing, sheds, dams and land set aside for conservation purposes.

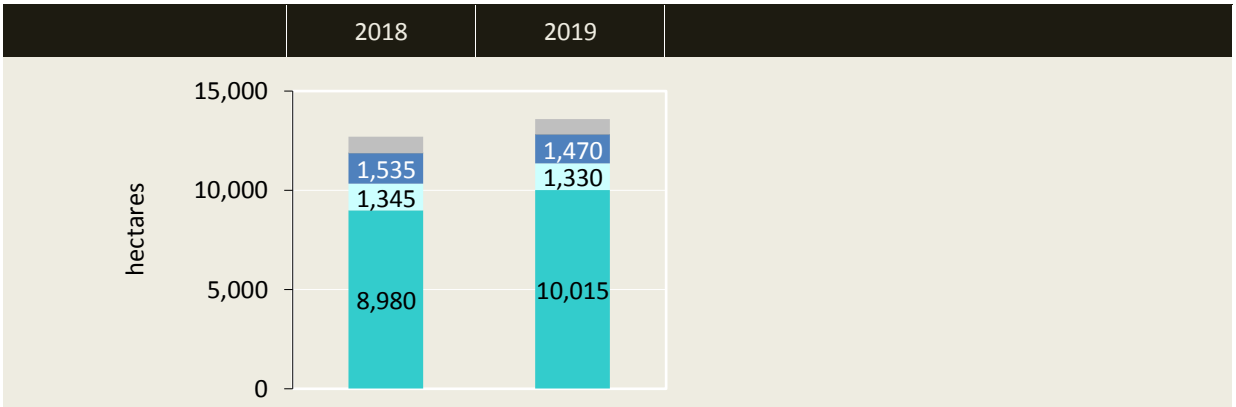
3.4.5 Wemen river reach - irrigation methods

Figure 45 summarises the change in irrigation methods in the Wemen river reach from 2018 to 2019.

Drippers remained the dominant irrigation method in 2018 and 2019.

From 2018 to 2019:

- Drip irrigation increased by 1,035 ha, a 12% increase from 8,980 ha to 10,015 ha.
- Lowlevel irrigation decreased by 15 ha, a 1% decrease from 1,345 ha to 1,330 ha.
- Overhead irrigation decreased by 65 ha, a 4% decrease from 1,535 ha to 1,470 ha.
- Furrow irrigation remained at 5 ha in 2018 and 2019.



Irrigation method	2018	2019	% of 2019 total	Change (ha) 2018 to 2019	% Change 2018 to 2019
Drip	8,980	10,015	74%	+1,035	+12%
Low level	1,345	1,330	10%	-15	-1%
Overhead	1,535	1,470	11%	-65	-4%
Furrow, flood	5	5	<1%	0	0%
Vacant	835	775	6%	-60	-7%
Total hectares	12,700	13,595	100%	+895	+7%

Figure 45: Wemen river reach - irrigation methods from 2018 to 2019

3.4.6 Wemen river reach - salinity impact zones

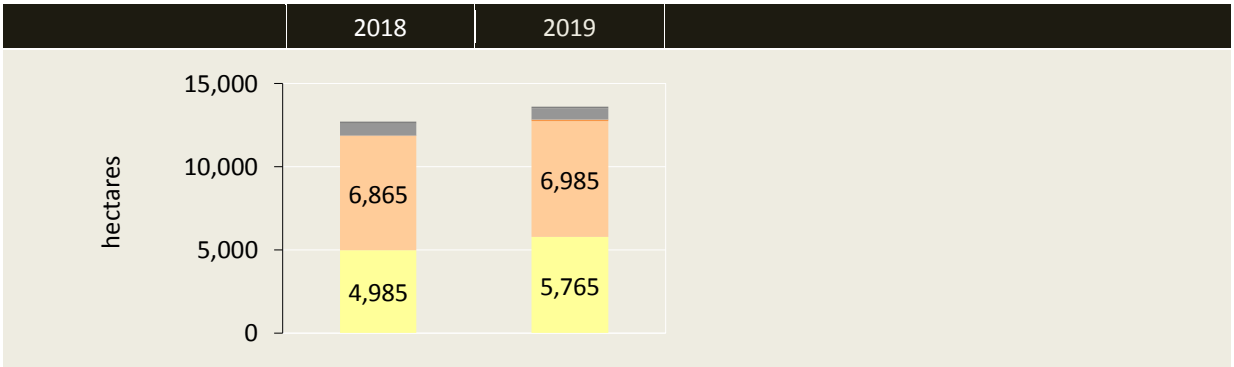
Figure 46 summarises the irrigable area in each salinity impact zone in the Wemen river reach from 2018 to 2019. Wemen private diverters are in low salinity impact zones L1, L2 and L3. There are no high salinity impact zones.

From 2018 to 2019, the area irrigated in:

- L1 increased by 780 ha, a 16% increase from 4,985 ha to 5,765 ha.
- L2 increased by 120 ha, a 2% increase from 6,865 ha to 6,985 ha.
- L3 increased by 55 ha, a 367% increase from 15 ha to 70 ha.

From 2018 to 2019, the irrigable area in:

- L1 increased by 780 ha, a 16% increase from 5,005 ha to 5,785 ha.
- L2 increased by 95 ha, a 1% increase from 7,570 ha to 7,665 ha.
- L3 increased by 20 ha, a 16% increase from 125 ha to 145 ha.



Salinity impact zone		2018	2019	% of 2019 total	Change (ha) 2018 to 2019	% Change 2018 to 2019
Irrigated	L1	4,985	5,765	42%	+780	+16%
	L2	6,865	6,985	51%	+120	+2%
	L3	15	70	1%	+55	+367%
	L4	-	-	-	-	-
	HIZ	-	-	-	-	-
Not Irrigated	L1	20	20	0%	0	0%
	L2	705	680	5%	-25	-4%
	L3	110	75	1%	-35	-32%
	L4	-	-	-	-	-
	HIZ	-	-	-	-	-
Total (ha)		12,700	13,595	100%	+895	+7%

Figure 46: Wemen river reach - irrigable area in each salinity impact zone from 2018 to 2019

3.5 Colignan river reach (*Colignan to Yatpool*)

In summary for the Colignan river reach

Change in crop types from 2018 to 2019

Citrus plantings were the dominant crop in 2018 and 2019. The main changes from 2018 to 2019 were:

1. Wine grape plantings increased by 130 ha, a 5% increase from 2,765 ha to 2,895 ha.
2. Citrus plantings increased by 120 ha, a 4% increase from 3,125 ha to 3,245 ha.
3. Table grape plantings increased by 65 ha, a 7% increase from 875 ha to 940 ha.
4. Almond plantings increased by 30 ha, a 3% increase from 1,000 ha to 1,030 ha.

Planting trends - permanent plantings, seasonal crops and vacant areas

From 2018 to 2019:

- Permanent plantings increased by 375 ha; a 4% increase from 9,145 ha to 9,520 ha.
- Seasonal cropping decreased by 30 ha; a 3% decrease from 1,105 ha to 1,075 ha.
- Vacant areas, previously permanent plantings, decreased by 60 ha; a 6% decrease from 950 ha to 890 ha.
- Vacant areas, previously seasonal crops, decreased by 15 ha; a 2% decrease from 625 ha to 610 ha.

Irrigation development - new and retired areas

The irrigable area in the Colignan river reach increased by 270 ha, a 2% increase from 11,825 ha in 2018 to 12,095 ha in 2019. The increase of 270 ha was expansion, no areas were retired from irrigation.

Irrigation methods 2018 to 2019

Drippers remained the dominant irrigation method in 2018 and 2019. From 2018 to 2019:

- Drip irrigation increased by 350 ha, a 5% increase from 7,580 ha to 7,930 ha.
- Lowlevel irrigation increased by 70 ha, a 7% increase from 1,020 ha to 1,090 ha.
- Overhead irrigation decreased by 75 ha, a 5% decrease from 1,620 ha to 1,545 ha.
- Furrow remained at 30 ha in 2018 and 2019.

Salinity impact zones 2018 to 2019

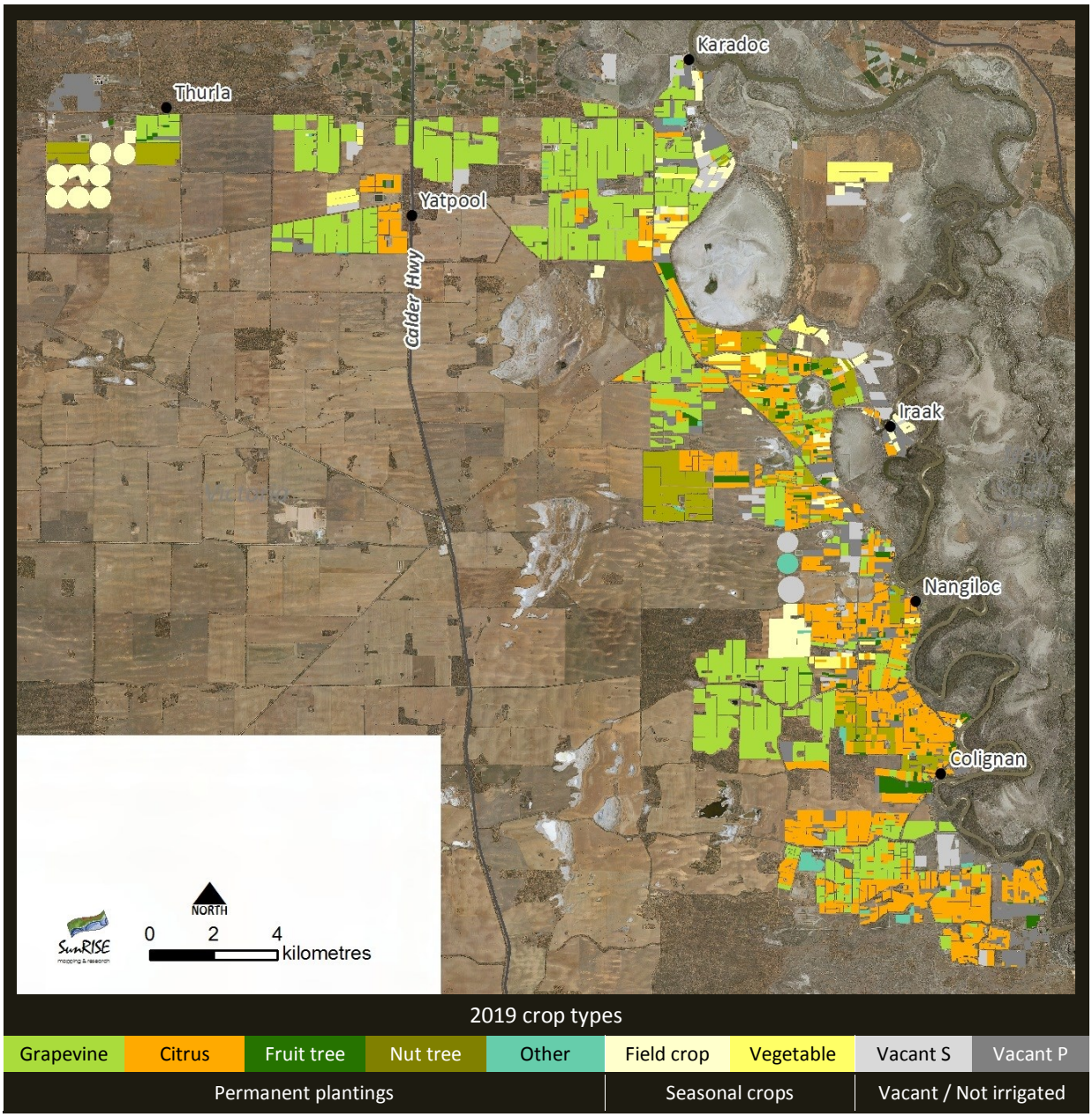
The Colignan river reach is in the low salinity impact zones, L1 and L4, and in the high impact zone, HIZ. Irrigation development from 2018 to 2019 occurred predominantly in L4.

From 2018 to 2019, the irrigable area in:

- L1 increased by 130 ha, a 7% increase from 1,965 ha to 2,095 ha.
- L4 increased by 145 ha, a 2% increase from 8,685 ha to 8,830 ha.
- HIZ decreased by 5 ha, a less than 1% decrease from 1,175 ha to 1,170 ha.

3.5.1 Colignan river reach - crop types in 2019

Map 18 shows the Colignan river reach with crop types in 2019.



Map 18: Colignan river reach showing 2019 crop types

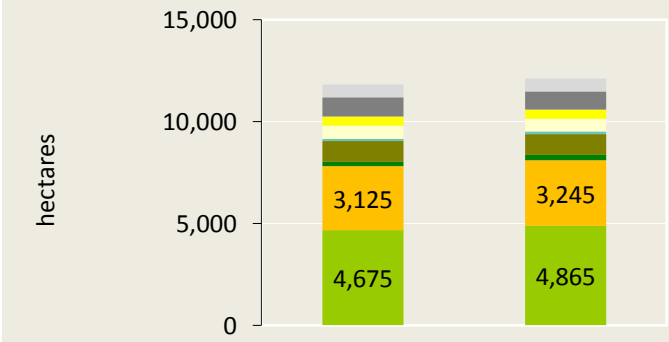
3.5.2 Colignan river reach - crop types from 2018 to 2019

Figure 47 summarises the change in irrigated crops in the Colignan river reach from 2018 to 2019.

Citrus plantings were the dominant crop in 2018 and 2019.

The main changes from 2018 to 2019 were:

1. Wine grape plantings increased by 130 ha, a 5% increase from 2,765 ha to 2,895 ha.
2. Citrus plantings increased by 120 ha, a 4% increase from 3,125 ha to 3,245 ha.
3. Table grape plantings increased by 65 ha, a 7% increase from 875 ha to 940 ha.
4. Almond plantings increased by 30 ha, a 3% increase from 1,000 ha to 1,030 ha.



Crop type		2018 ha	2019 ha	% of 2019 total	Change (ha) 2018 to 2019	% Change 2018 to 2019
Permanent	Grape Dried	1,035	1,030	9%	-5	-<1%
	Grape Table	875	940	8%	+65	+7%
	Grape Wine	2,765	2,895	24%	+130	+5%
	Citrus	3,125	3,245	27%	+120	+4%
	Fruit Olive	5	5	<1%	0	0%
	Fruit Other	225	235	2%	+10	+4%
	Nut Almond	1,000	1,030	9%	+30	+3%
	Nut Other	10	10	0%	0	0%
	Other	105	130	1%	+25	+24%
Seasonal	Field Crop	660	635	5%	-25	-4%
	Veg. Carrot	-	-	-	-	-
	Veg. Potato	-	-	-	-	-
	Veg. Other	445	440	4%	-5	-1%
	Vacant P	950	890	7%	-60	-6%
	Vacant S	625	610	5%	-15	-2%
Total		11,825	12,095	100%	+270	+2%

Figure 47: Colignan river reach - crop types from 2018 to 2019

3.5.3 Colignan river reach - planting trends

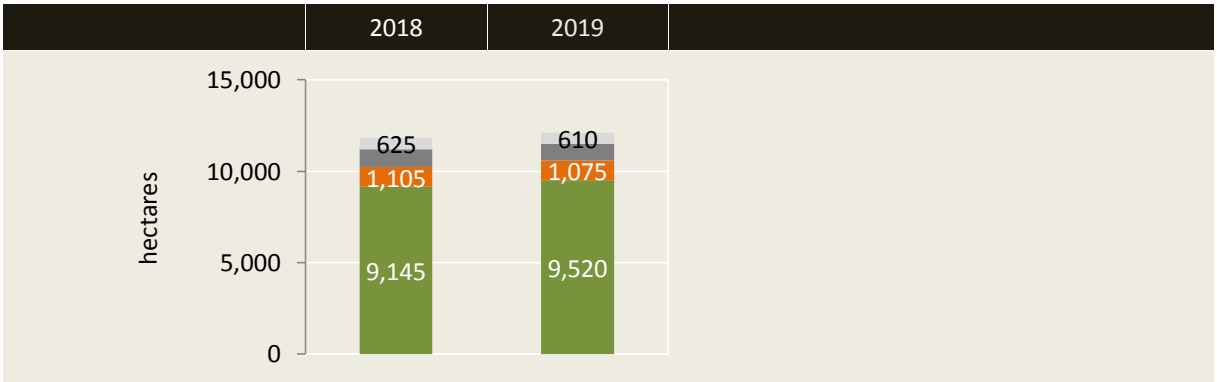
Figure 48 summarises planting trends in the Colignan river reach from 2018 to 2019.

The proportion of permanent plantings, seasonal cropping and vacant areas changed from:

- 77% permanent, 9% seasonal and 13% vacant in 2018; to
- 79% permanent, 9% seasonal and 12% vacant in 2019.

From 2018 to 2019:

- Permanent plantings increased by 375 ha; a 4% increase from 9,145 ha to 9,520 ha.
- Seasonal cropping decreased by 30 ha; a 3% decrease from 1,105 ha to 1,075 ha.
- Vacant areas, previously permanent plantings, decreased by 60 ha; a 6% decrease from 950 ha to 890 ha.
- Vacant areas, previously seasonal crops, decreased by 15 ha; a 2% decrease from 625 ha to 610 ha.



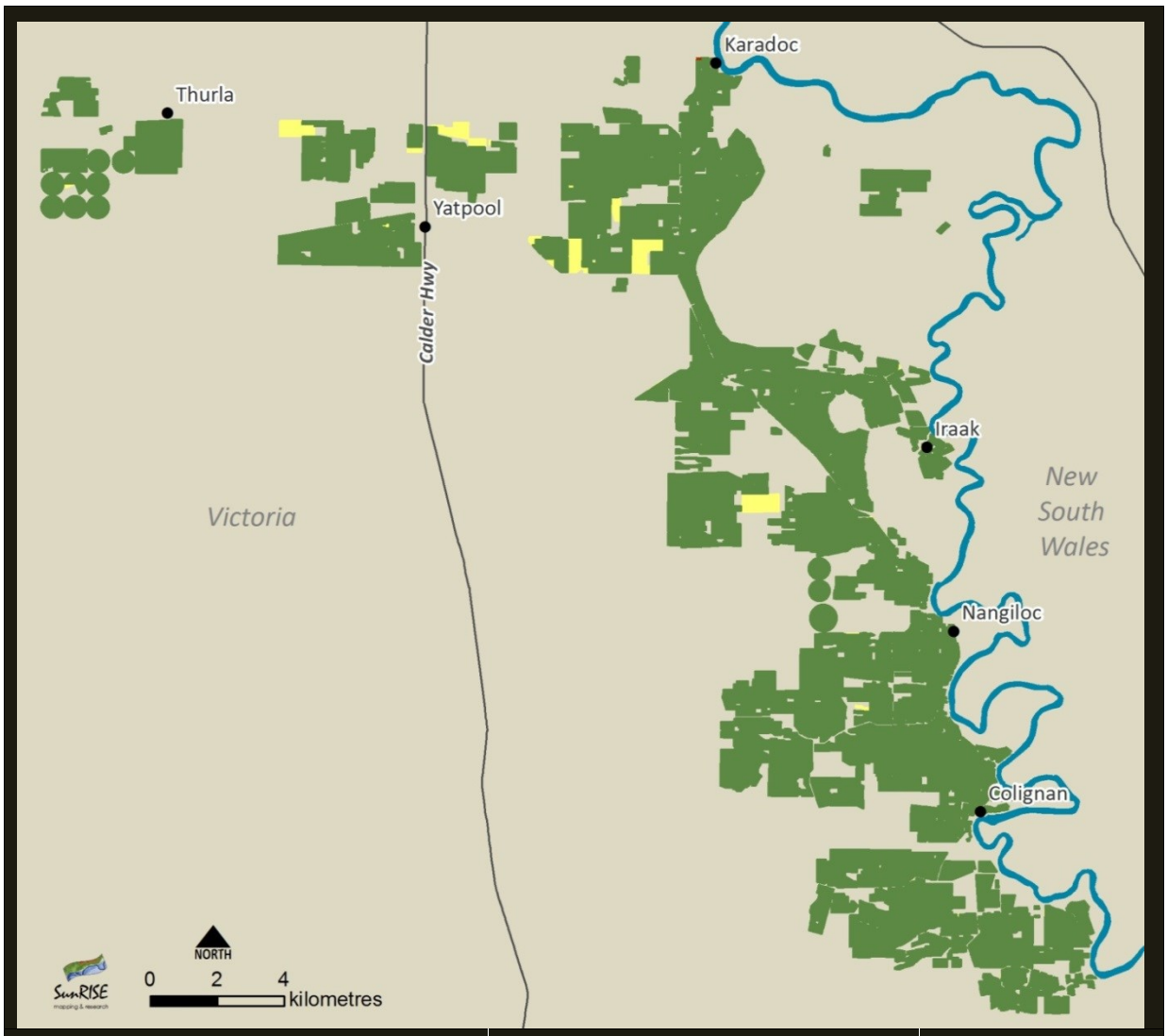
	2018	2019	% of 2019 total	Change (ha) 2018 to 2019	% Change 2018 to 2019
Permanent - irrigated	9,145	9,520	79%	+375	+4%
Seasonal - irrigated	1,105	1,075	9%	-30	-3%
Vacant - permanent	950	890	7%	-60	-6%
Vacant - seasonal	625	610	5%	-15	-2%
Total hectares	11,825	12,095	100%	+270	+2%
% Permanent	77%	79%			
% Seasonal	9%	9%			
% Vacant	13%	12%			

Figure 48: Colignan river reach - planting trends from 2018 to 2019

3.5.4 Colignan river reach - irrigation development

Map 19 shows irrigation development from 2018 to 2019 in the Colignan river reach with respect to new development (expansion) and areas retired[12] from irrigation.

- The irrigable area increased by 270 ha, a 2% increase from 11,825 ha in 2018 to 12,095 ha in 2019.
- The net increase of 270 ha comprised 0 ha retired from irrigation and 270 ha of expansion.



	Hectares		% Change
Irrigation areas in 2018 (2017-18 season)	11,825		
Retired between 2018 and 2019	0		0%
Expansion between 2018 and 2019	+270		+2%
Irrigation areas in 2019 (2018-19 season)	12,095		

Map 19: Colignan river reach - irrigation development from 2018 to 2019

[12] Retired areas have undergone a change in land use that precludes use for irrigation e.g. urban development, housing, sheds, dams and land set aside for conservation purposes.

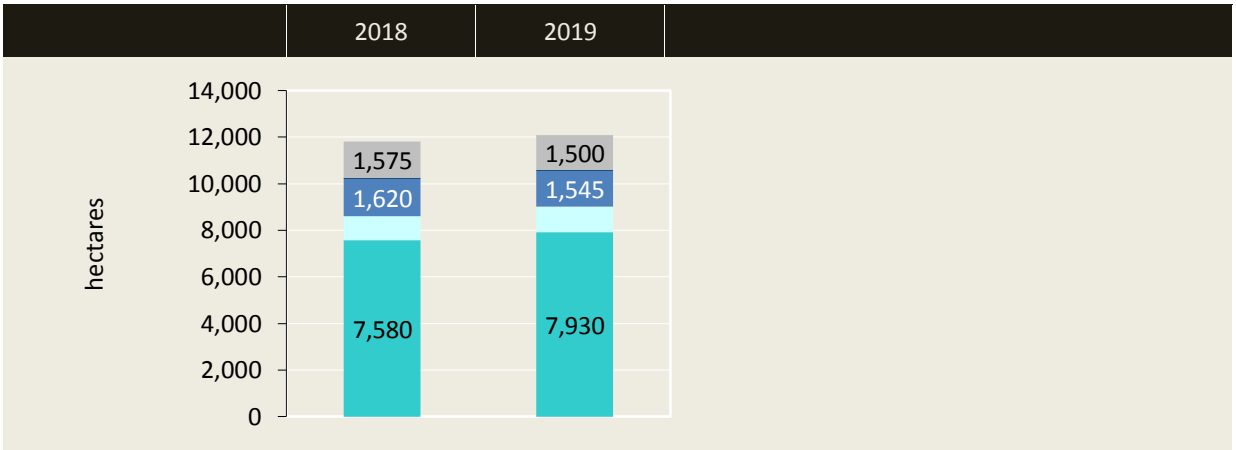
3.5.5 Colignan river reach - irrigation methods

Figure 49 summarises the change in irrigation methods in the Colignan river reach from 2018 to 2019.

Drippers remained the dominant irrigation method in 2018 and 2019.

From 2018 to 2019:

- Drip irrigation increased by 350 ha, a 5% increase from 7,580 ha to 7,930 ha.
- Lowlevel irrigation increased by 70 ha, a 7% increase from 1,020 ha to 1,090 ha.
- Overhead irrigation decreased by 75 ha, a 5% decrease from 1,620 ha to 1,545 ha.
- Furrow remained at 30 ha in 2018 and 2019.



Irrigation method	2018	2019	% of 2019 total	Change (ha) 2018 to 2019	% Change 2018 to 2019
Drip	7,580	7,930	66%	+350	+5%
Low level	1,020	1,090	9%	+70	+7%
Overhead	1,620	1,545	13%	-75	-5%
Furrow, flood	30	30	0%	0	0%
Vacant	1,575	1,500	12%	-75	-5%
Total hectares	11,825	12,095	100%	+270	+2%

Figure 49: Colignan river reach - irrigation methods from 2018 to 2019

3.5.6 Colignan river reach - salinity impact zones

Figure 50 summarises the irrigable area in each salinity impact zone in the Colignan river reach from 2018 to 2019.

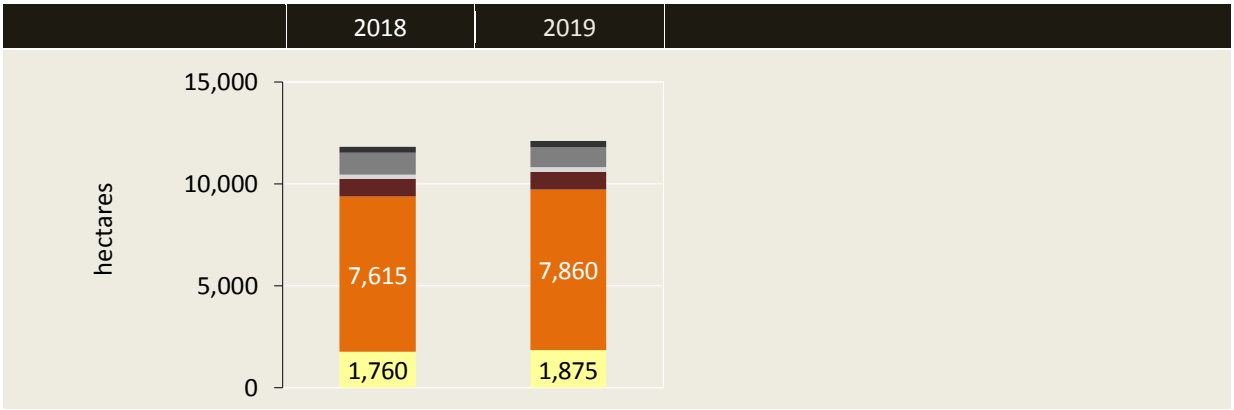
Colignan private diverters are in low salinity impact zones L1 and L4, and the high salinity impact zone, HIZ.

From 2018 to 2019, the area irrigated in:

- L1 increased by 115 ha, a 7% increase from 1,760 ha to 1,875 ha.
- L4 increased by 245 ha, a 3% increase from 7,615 ha to 7,860 ha.
- HIZ decreased by 15 ha, a 2% decrease from 875 ha to 860 ha.

From 2018 to 2019, the irrigable area in:

- L1 increased by 130 ha, a 7% increase from 1,965 ha to 2,095 ha.
- L4 increased by 145 ha, a 2% increase from 8,685 ha to 8,830 ha.
- HIZ decreased by 5 ha, a less than 1% decrease from 1,175 ha to 1,170 ha.



Salinity impact zone		2018	2019	% of 2019 total	Change (ha) 2018 to 2019	% Change 2018 to 2019
Irrigated	L1	1,760	1,875	16%	+115	+7%
	L2	-	-	-	-	-
	L3	-	-	-	-	-
	L4	7,615	7,860	65%	+245	+3%
	HIZ	875	860	7%	-15	-2%
Not Irrigated	L1	205	220	2%	+15	+7%
	L2	-	-	-	-	-
	L3	-	-	-	-	-
	L4	1,070	970	8%	-100	-9%
	HIZ	300	310	3%	+10	+3%
Total (ha)		11,825	12,095	100%	+270	+2%

Figure 50: Colignan river reach - irrigable area in each salinity impact zone from 2018 to 2019

3.6 Mildura river reach (*Mildura to Lock 10*)

In summary for the Mildura river reach

Change in crop types from 2018 to 2019

Table grape plantings were the dominant crop in 2018 and 2019. The main changes from 2018 to 2019 were:

1. Field crops increased by 65 ha, a 20% increase from 320 ha to 385 ha.
2. Wine grape plantings increased by 20 ha, a 7% increase from 300 ha to 320 ha.
3. Dried grape plantings decreased by 20 ha, an 18% decrease from 110 ha to 90 ha.
4. Table grape plantings increased by 15 ha, a 3% increase from 440 ha to 455 ha.
5. Fruit trees, other than olives, increased by 15 ha, a 60% increase from 25 ha to 40 ha.

Planting trends - permanent plantings, seasonal crops and vacant areas

From 2018 to 2019:

- Permanent plantings increased by 40 ha; a 4% increase from 1,060 ha to 1,100 ha.
- Seasonal cropping increased by 60 ha; a 17% increase from 350 ha to 410 ha.
- Vacant areas, previously permanent plantings, decreased by 25 ha; a 10% decrease from 260 ha to 235 ha.
- Vacant areas, previously seasonal crops, decreased by 25 ha; an 8% decrease from 300 ha to 275 ha.

Irrigation development - new and retired areas

The irrigable area in the Mildura river reach increased by 50 ha, a 3% increase from 1,970 ha in 2018 to 2,020 ha in 2019. The net increase of 50 ha was the balance of 55 ha expansion and 5 ha retired from irrigation.

Irrigation methods 2018 to 2019

Drippers remained the dominant irrigation method in 2018 and 2019. From 2018 to 2019:

- Drip irrigation increased by 45 ha, a 6% increase from 800 ha to 845 ha.
- Lowlevel irrigation remained at 170 ha in 2018 and 2019.
- Overhead irrigation increased by 25 ha, a 9% increase from 265 ha to 290 ha.
- Furrow irrigation increased by 30 ha, a 17% increase from 175 ha to 205 ha.

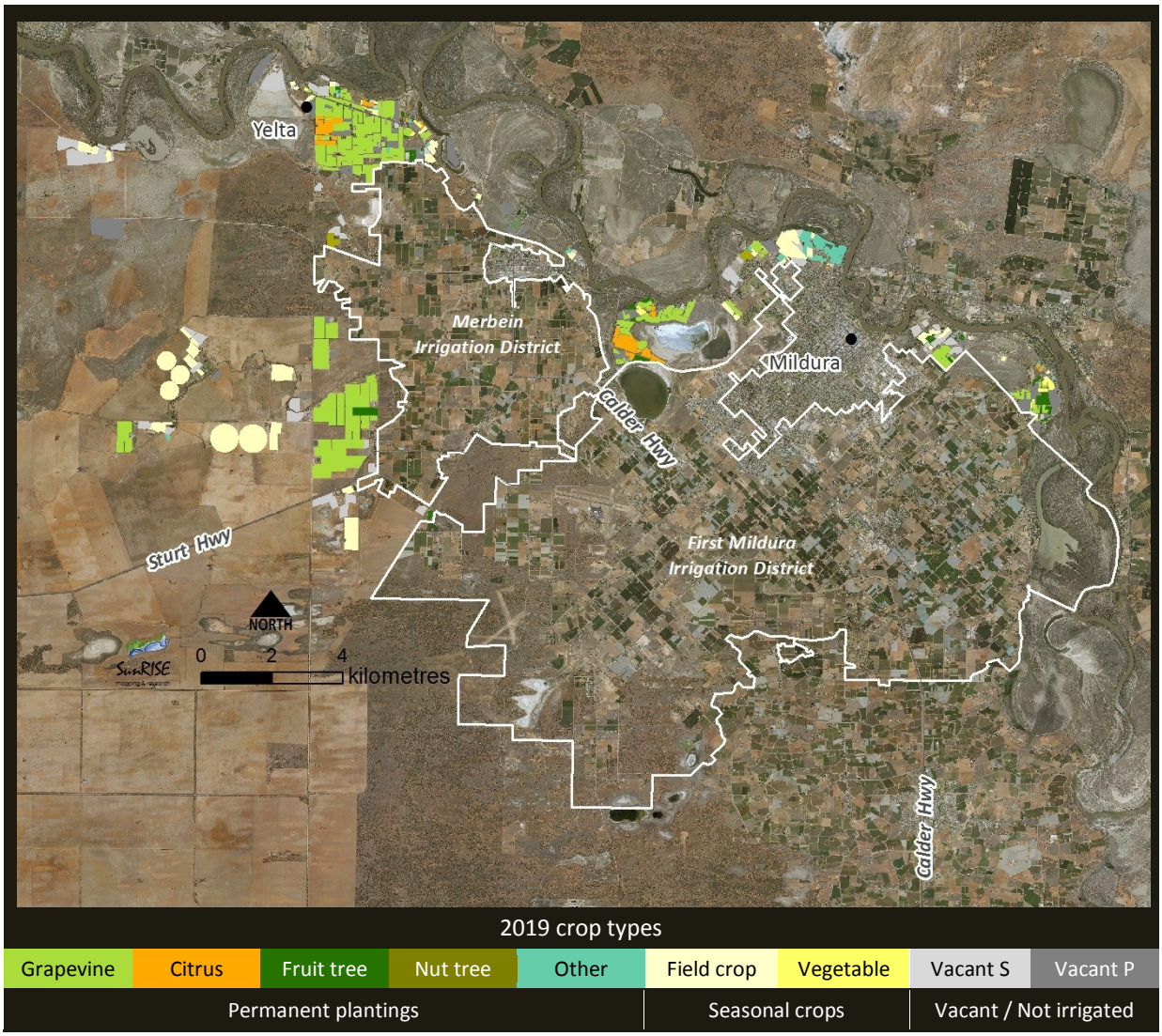
Salinity impact zones 2018 to 2019

The Mildura river reach is in the lowest salinity impact zone, L1 and the high impact zone, HIZ. Irrigation development from 2018 to 2019 occurred predominantly in L1.
From 2018 to 2019, the irrigable area in:

- L1 increased by 50 ha, a 7% increase from 735 ha to 785 ha.
- HIZ remained at 1,235 ha in 2018 and 2019. There were 5 ha retired from irrigation and 5 ha of new HIZ areas from development on existing irrigation properties.

3.6.1 Mildura river reach - crop types in 2019

Map 20 shows the Mildura river reach with crop types in 2019.



Map 20: Mildura river reach showing 2019 crop types

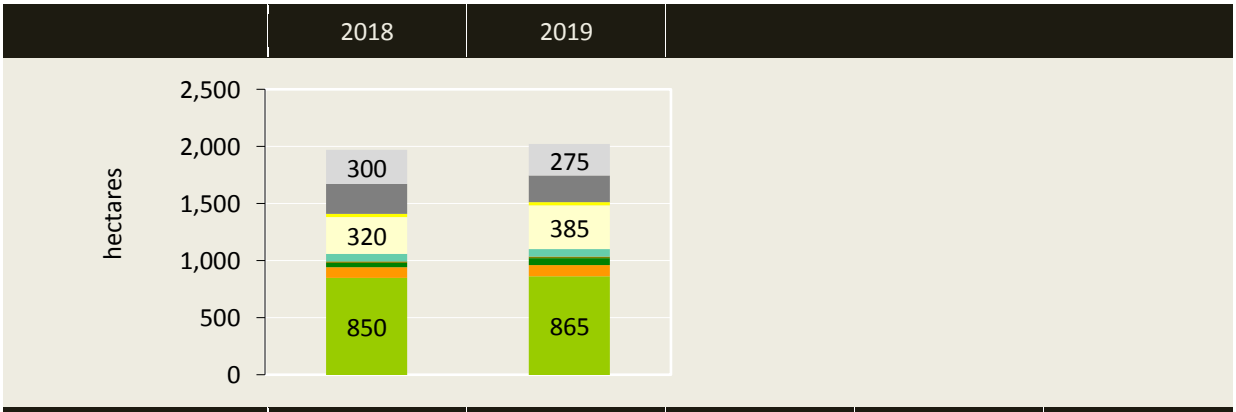
3.6.2 Mildura river reach - crop types from 2018 to 2019

Figure 51 summarises the change in irrigated crops in the Mildura river reach from 2018 to 2019.

Table grape plantings were the dominant crop in 2018 and 2019.

The main changes from 2018 to 2019 were:

1. Field crops increased by 65 ha, a 20% increase from 320 ha to 385 ha.
2. Wine grape plantings increased by 20 ha, a 7% increase from 300 ha to 320 ha.
3. Dried grape plantings decreased by 20 ha, an 18% decrease from 110 ha to 90 ha.
4. Table grape plantings increased by 15 ha, a 3% increase from 440 ha to 455 ha.
5. Fruit trees, other than olives, increased by 15 ha, a 60% increase from 25 ha to 40 ha.



Crop type		2018 ha	2019 ha	% of 2019 total	Change (ha) 2018 to 2019	% Change 2018 to 2019
Permanent	Grape Dried	110	90	4%	-20	-18%
	Grape Table	440	455	23%	+15	+3%
	Grape Wine	300	320	16%	+20	+7%
	Citrus	90	95	5%	+5	+6%
	Fruit Olive	15	20	1%	+5	+33%
	Fruit Other	25	40	2%	+15	+60%
	Nut Almond	-	-	-	-	-
	Nut Other	15	15	1%	0	0%
	Other	65	65	3%	0	0%
Seasonal	Field Crop	320	385	19%	+65	+20%
	Veg. Carrot	-	-	-	-	-
	Veg. Potato	-	-	-	-	-
	Veg. Other	30	25	1%	-5	-17%
	Vacant P	260	235	12%	-25	-10%
	Vacant S	300	275	13%	-25	-8%
Total		1,970	2,020	100%	+50	+3%

Figure 51: Mildura river reach - crop types from 2018 to 2019

3.6.3 Mildura river reach - planting trends

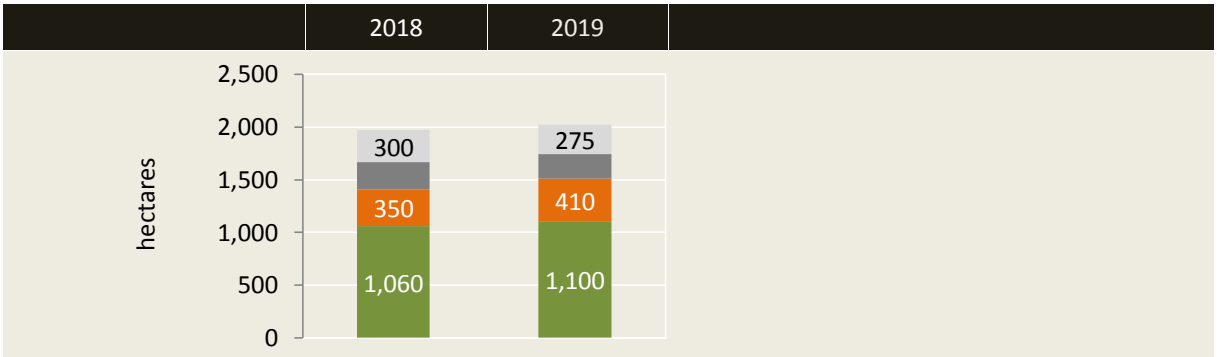
Figure 52 summarises planting trends in the Mildura river reach from 2018 to 2019.

The proportion of permanent plantings, seasonal cropping and vacant areas changed from:

- 54% permanent, 18% seasonal and 28% vacant in 2018; to
- 55% permanent, 20% seasonal and 25% vacant in 2019.

From 2018 to 2019:

- Permanent plantings increased by 40 ha; a 4% increase from 1,060 ha to 1,100 ha.
- Seasonal cropping increased by 60 ha; a 17% increase from 350 ha to 410 ha.
- Vacant areas, previously permanent plantings, decreased by 25 ha; a 10% decrease from 260 ha to 235 ha.
- Vacant areas, previously seasonal crops, decreased by 25 ha; an 8% decrease from 300 ha to 275 ha.



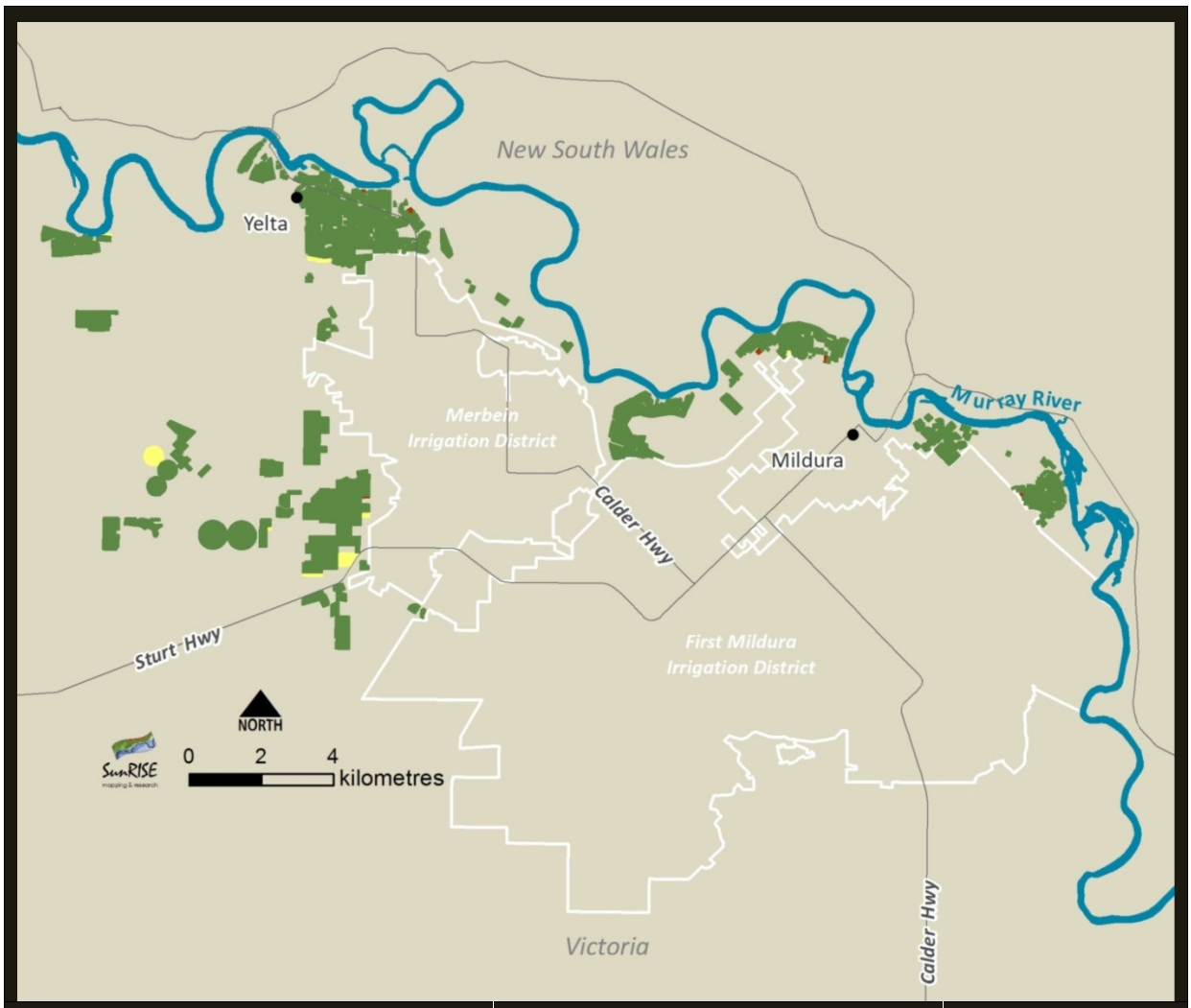
	2018	2019	% of 2019 total	Change (ha) 2018 to 2019	% Change 2018 to 2019
Permanent - irrigated	1,060	1,100	55%	+40	+4%
Seasonal - irrigated	350	410	20%	+60	+17%
Vacant - permanent	260	235	12%	-25	-10%
Vacant - seasonal	300	275	13%	-25	-8%
Total hectares	1,970	2,020	100%	+50	+3%
% Permanent	54%	55%			
% Seasonal	18%	20%			
% Vacant	28%	25%			

Figure 52: Mildura river reach - planting trends from 2018 to 2019

3.6.4 Mildura river reach - irrigation development

Map 21 shows irrigation development from 2018 to 2019 in the Mildura river reach with respect to new development (expansion) and areas retired[13] from irrigation.

- The irrigable area increased by 50 ha, a 3% increase from 1,970 ha in 2018 to 2,020 ha in 2019.
- The net increase of 50 ha comprised 5 ha retired from irrigation and 55 ha of expansion.



	Hectares			% Change
Irrigation areas in 2018 (2017-18 season)	1,970			
Retired between 2018 and 2019		-5		-<1%
Expansion between 2018 and 2019		+55		+3%
Irrigation areas in 2019 (2018-19 season)			2,020	

Map 21: Mildura river reach - irrigation development from 2018 to 2019

[13] Retired areas have undergone a change in land use that precludes use for irrigation e.g. urban development, housing, sheds, dams and land set aside for conservation purposes.

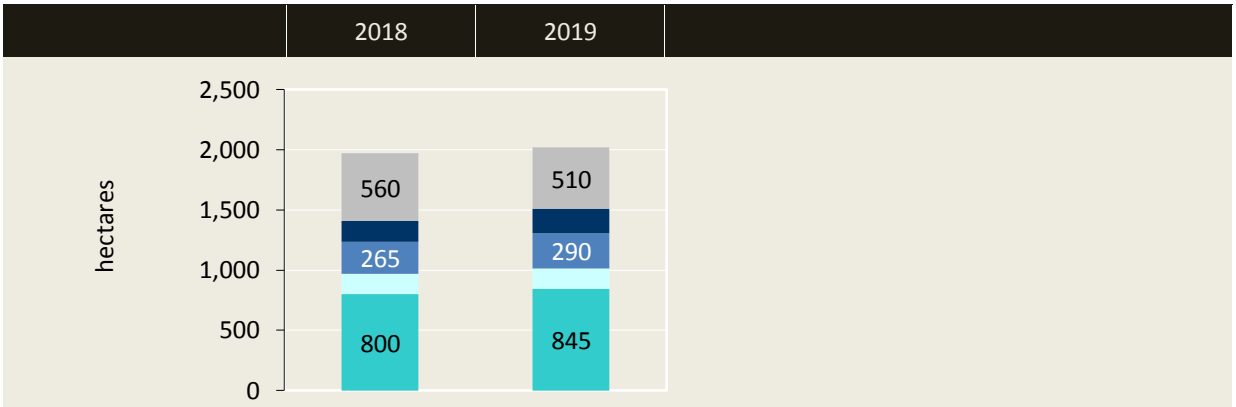
3.6.5 Mildura river reach - irrigation methods

Figure 53 summarises the change in irrigation methods in the Mildura river reach from 2018 to 2019.

Drippers remained the dominant irrigation method in 2018 and 2019.

From 2018 to 2019:

- Drip irrigation increased by 45 ha, a 6% increase from 800 ha to 845 ha.
- Lowlevel irrigation remained at 170 ha in 2018 and 2019.
- Overhead irrigation increased by 25 ha, a 9% increase from 265 ha to 290 ha.
- Furrow irrigation increased by 30 ha, a 17% increase from 175 ha to 205 ha.



Irrigation method	2018	2019	% of 2019 total	Change (ha) 2018 to 2019	% Change 2018 to 2019
Drip	800	845	42%	+45	+6%
Low level	170	170	8%	0	0%
Overhead	265	290	14%	+25	+9%
Furrow, flood	175	205	10%	+30	+17%
Vacant	560	510	25%	-50	-9%
Total hectares	1,970	2,020	100%	+50	+3%

Figure 53: Mildura river reach - irrigation methods from 2018 to 2019

3.6.6 Mildura river reach - salinity impact zones

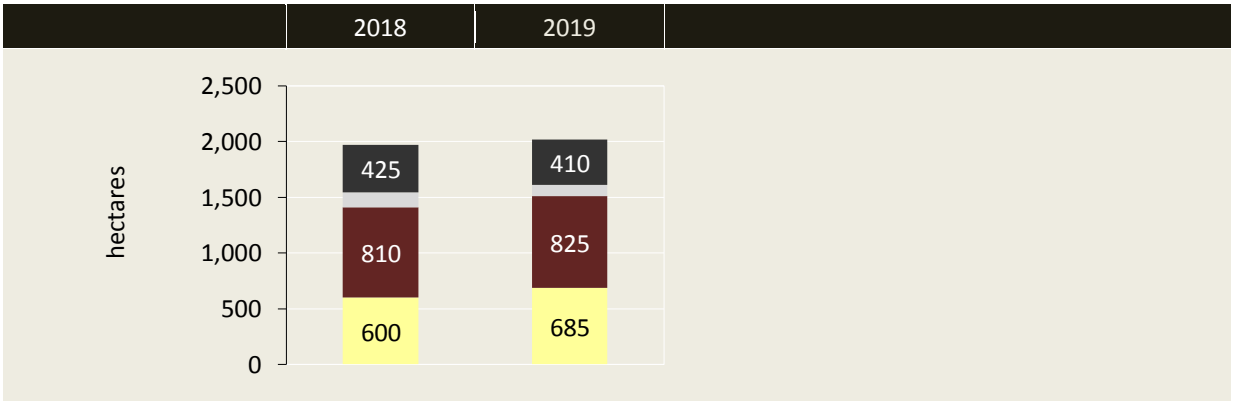
Figure 54 summarises the irrigable area in each salinity impact zone in the Mildura river reach from 2018 to 2019. Mildura private diverters are in the lowest salinity impact zone, L1 and the high salinity impact zone, HIZ.

From 2018 to 2019, the area irrigated in:

- L1 increased by 85 ha, a 14% increase from 600 ha to 685 ha.
- HIZ increased by 15 ha, a 2% increase from 810 ha to 825 ha. These areas were vacant in 2018, but brought back into production in 2019.

From 2018 to 2019, the irrigable area in:

- L1 increased by 50 ha, a 7% increase from 735 ha to 785 ha.
- HIZ remained at 1,235 ha in 2018 and 2019. There were 5 ha retired from irrigation and 5 ha of new HIZ areas from development on existing irrigation properties.



Salinity impact zone		2018	2019	% of 2019 total	Change (ha) 2018 to 2019	% Change 2018 to 2019
Irrigated	L1	600	685	34%	+85	+14%
	L2	-	-	-	-	-
	L3	-	-	-	-	-
	L4	-	-	-	-	-
	HIZ	810	825	41%	+15	+2%
Not Irrigated	L1	135	100	5%	-35	-26%
	L2	-	-	-	-	-
	L3	-	-	-	-	-
	L4	-	-	-	-	-
	HIZ	425	410	20%	-15	-4%
Total (ha)		1,970	2,020	100%	+50	+3%

Figure 54: Mildura river reach - irrigable area in each salinity impact zone from 2018 to 2019

3.7 Lock 10 to the South Australian Border

In summary for the Lock 10 to South Australia river reach

Change in crop types from 2018 to 2019

Almond plantings were the dominant crop in 2018 and 2019.

The main changes from 2018 to 2019 were:

1. Almond plantings increased by 115 ha, a 6% increase from 1,845 ha to 1,960 ha.
2. Citrus plantings increased by 10 ha, an 8% increase from 125 ha to 135 ha.

Planting trends - permanent plantings, seasonal crops and vacant areas

From 2018 to 2019:

- Permanent plantings increased by 125 ha; a 5% increase from 2,665 ha to 2,790 ha.
- Seasonal cropping increased by 5 ha; a 50% increase from 10 ha to 15 ha.
- Vacant areas, previously permanent plantings, remained at 135 ha in 2018 and 2019.
- Vacant areas, previously seasonal crops, remained at 345 ha in 2018 and 2019.

Irrigation development - new and retired areas

The irrigable area in the Lock 10 to SA river reach increased by 130 ha, a 4% increase from 3,155 ha in 2018 to 3,285 ha in 2019.

The increase of 130 ha were expansion areas, no areas were retired from irrigation.

Irrigation methods 2018 to 2019

Drippers remained the dominant irrigation method in 2018 and 2019.

From 2018 to 2019:

- Drip irrigation increased by 130 ha, a 7% increase from 1,775 ha to 1,905 ha.
- Lowlevel irrigation remained at 895 ha in 2018 and in 2019.
- Overhead irrigation remained at 5 ha in 2018 and in 2019.
- There was no flood or furrow irrigation in 2018 or 2019.

Salinity impact zones 2018 to 2019

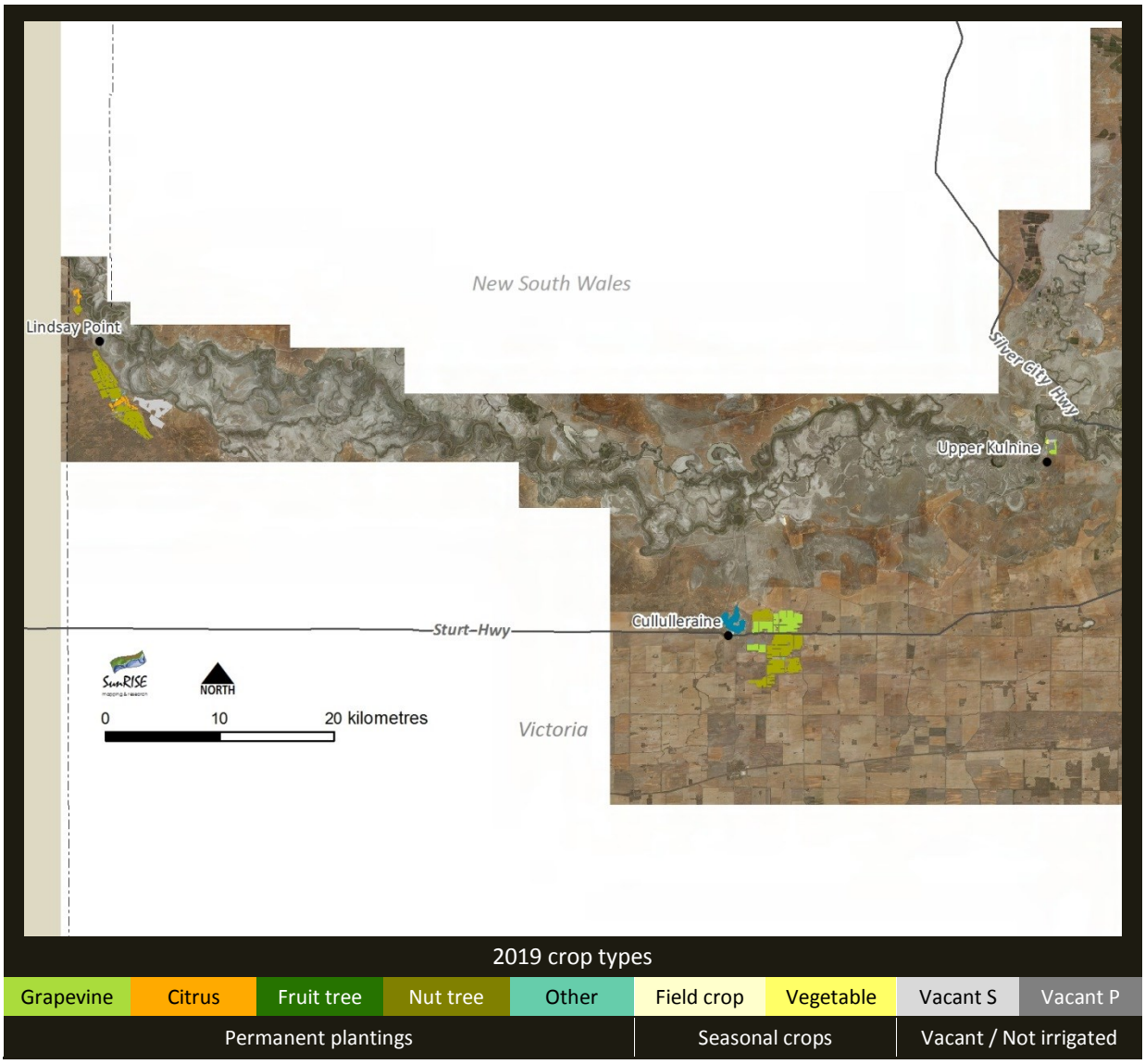
The Lock 10 to South Australia river reach is in the lowest salinity impact zone, L1 and in the high salinity impact zone, HIZ. Irrigation development from 2018 to 2019 occurred in L1.

From 2018 to 2019, the irrigable area in:

- L1 increased by 130 ha, a 5% increase from 2,590 ha to 2,720 ha.
- HIZ remained at 565 ha in 2018 and 2019.

3.7.1 Lock 10 to South Australia - crop types in 2019

Map 22 shows the Lock 10 to South Australia river reach with crop types in 2019.



Map 22: Lock 10 to South Australia showing 2019 crop types

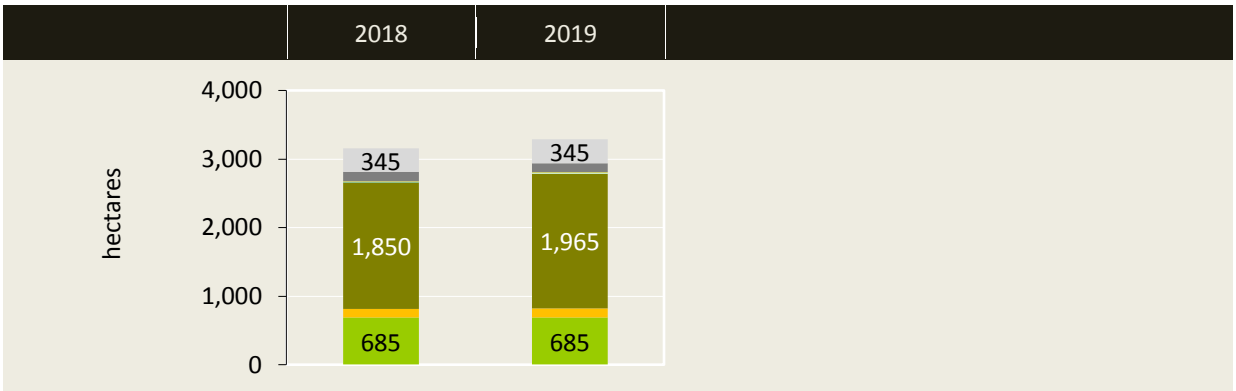
3.7.2 Lock 10 to South Australia - crop types from 2018 to 2019

Figure 55 summarises the change in irrigated crops in the Lock 10 to South Australia river reach from 2018 to 2019.

Almond plantings were the dominant crop in 2018 and 2019.

The main changes from 2018 to 2019 were:

1. Almond plantings increased by 115 ha, a 6% increase from 1,845 ha to 1,960 ha.
2. Citrus plantings increased by 10 ha, an 8% increase from 125 ha to 135 ha.



Crop type		2018 ha	2019 ha	% of 2019 total	Change (ha) 2018 to 2019	% Change 2018 to 2019
Permanent	Grape Dried	15	15	0%	0	0%
	Grape Table	-	-	-	-	-
	Grape Wine	670	670	20%	0	0%
	Citrus	125	135	4%	+10	+8%
	Fruit Olive	-	-	-	-	-
	Fruit Other	-	-	-	-	-
	Nut Almond	1,845	1,960	60%	+115	+6%
	Nut Other	5	5	0%	0	0%
	Other	5	5	0%	0	0%
Seasonal	Field Crop	5	10	0%	+5	+100%
	Veg. Carrot	-	-	-	-	-
	Veg. Potato	-	-	-	-	-
	Veg. Other	5	5	0%	0	0%
	Vacant P	135	135	4%	0	0%
	Vacant S	345	345	11%	0	0%
Total		3,155	3,285	100%	+130	+4%

Figure 55: Lock 10 to South Australia - crop types from 2018 to 2019

3.7.3 Lock 10 to South Australia - planting trends

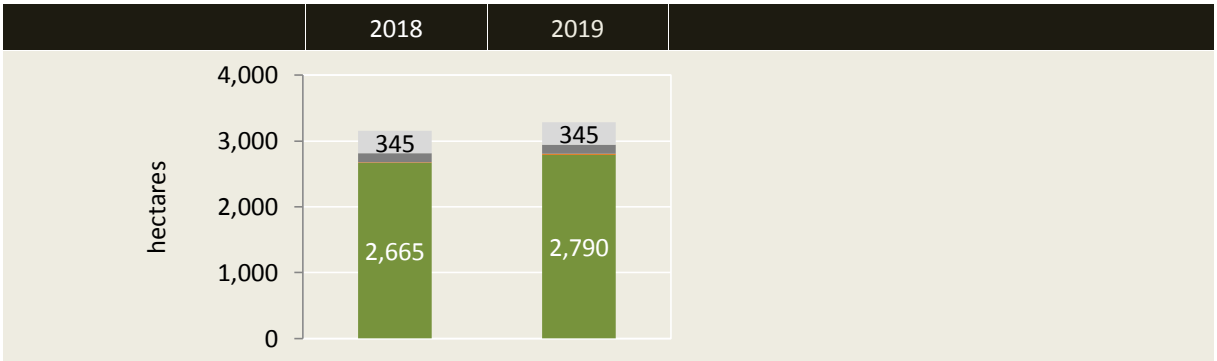
Figure 56 summarises planting trends in the Lock 10 to South Australia river reach from 2018 to 2019.

The proportion of permanent plantings, seasonal cropping and vacant areas changed from:

- 84% permanent, <1% seasonal and 15% vacant in 2018; to
- 85% permanent, <1% seasonal and 15% vacant in 2019.

From 2018 to 2019:

- Permanent plantings increased by 125 ha; a 5% increase from 2,665 ha to 2,790 ha.
- Seasonal cropping increased by 5 ha; a 50% increase from 10 ha to 15 ha.
- Vacant areas, previously permanent plantings, remained at 135 ha in 2018 and 2019.
- Vacant areas, previously seasonal crops, remained at 345 ha in 2018 and 2019.



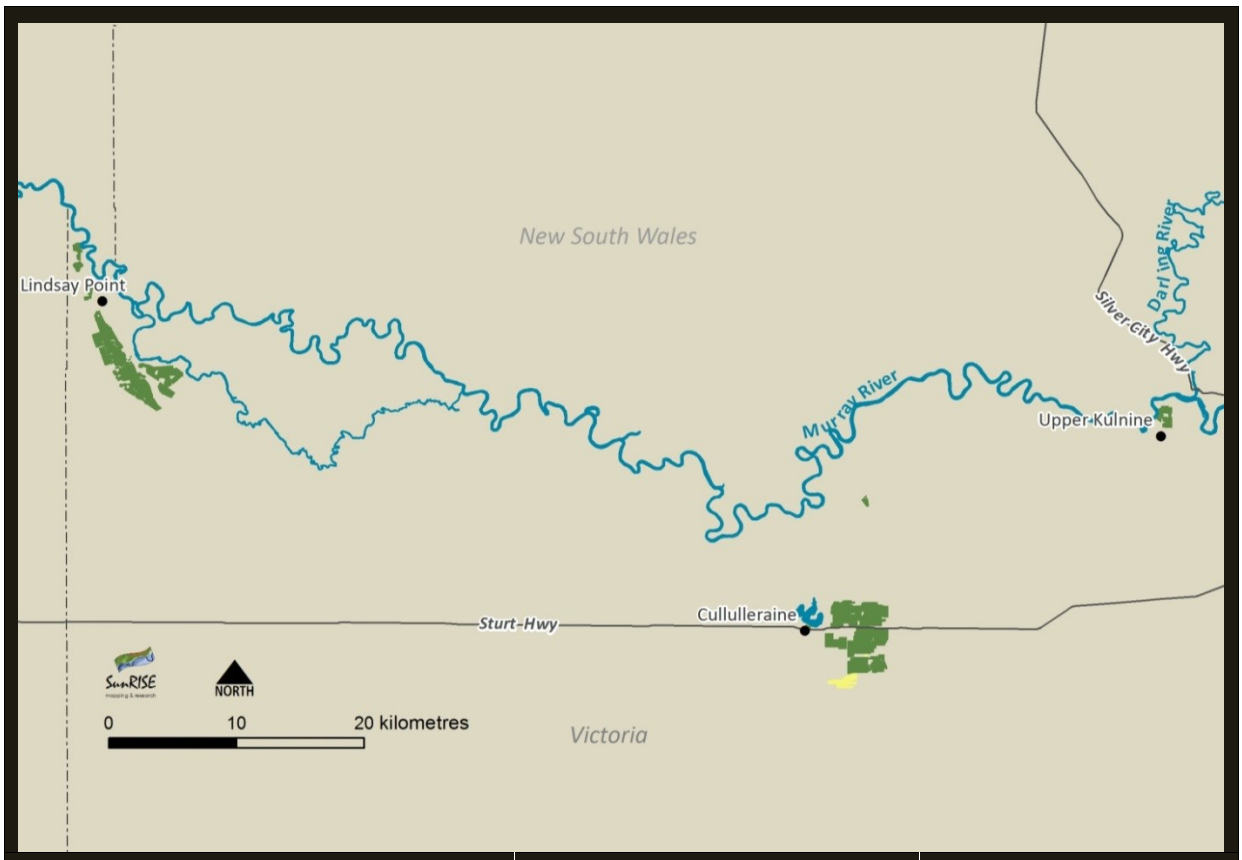
	2018	2019	% of 2019 total	Change (ha) 2018 to 2019	% Change 2018 to 2019
Permanent - irrigated	2,665	2,790	85%	+125	+5%
Seasonal - irrigated	10	15	<1%	+5	+50%
Vacant - permanent	135	135	4%	0	0%
Vacant - seasonal	345	345	11%	0	0%
Total hectares	3,155	3,285	100%	+130	+4%
% Permanent	84%	85%			
% Seasonal	<1%	<1%			
% Vacant	15%	15%			

Figure 56: Lock 10 to South Australia - planting trends from 2018 to 2019

3.7.4 Lock 10 to South Australia - irrigation development

Map 23 shows irrigation development in the Lock 10 to South Australia river reach with respect to new development (expansion) and areas retired[14] from irrigation from 2018 to 2019.

- The irrigable area increased by 130 ha, a 4% increase from 3,155 ha in 2018 to 3,285 ha in 2019.
- No areas were retired from irrigation.



	Hectares			% Change
Irrigation areas in 2018 (2017-18 season)	3,155			
Retired between 2018 and 2019		-0		0%
Expansion between 2018 and 2019		+130		+4%
Irrigation areas in 2019 (2018-19 season)			3,285	

Map 23: Lock 10 to South Australia - irrigation development from 2018 to 2019

[14] Retired areas have undergone a change in land use that precludes use for irrigation e.g. urban development, housing, sheds, dams and land set aside for conservation purposes.

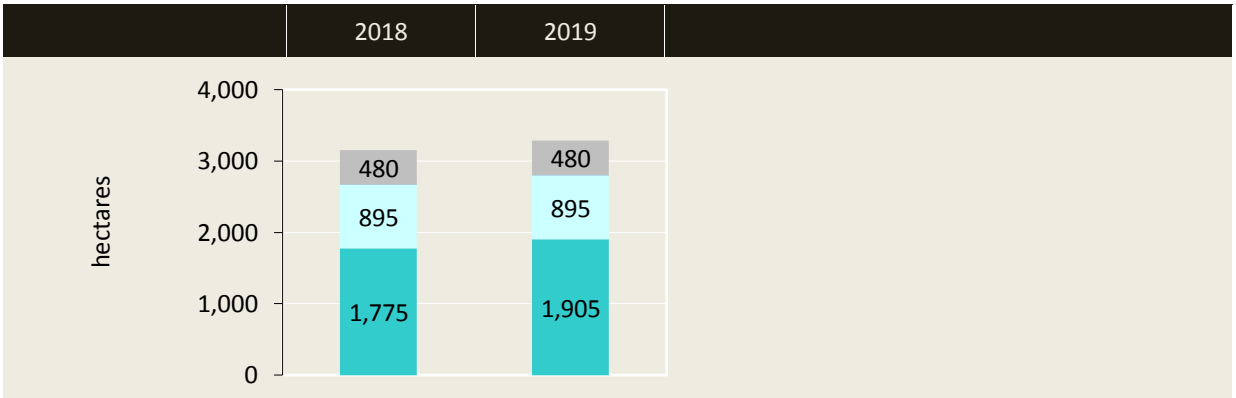
3.7.5 Lock 10 to South Australia - irrigation methods

Figure 57 summarises the change in irrigation methods in the Lock 10 to South Australia river reach from 2018 to 2019.

Drippers remained the dominant irrigation method in 2018 and 2019.

From 2018 to 2019:

- Drip irrigation increased by 130 ha, a 7% increase from 1,775 ha to 1,905 ha.
- Lowlevel irrigation remained at 895 ha in 2018 and in 2019.
- Overhead irrigation remained at 5 ha in 2018 and in 2019.
- There was no flood or furrow irrigation in 2018 or 2019.



Irrigation method	2018	2019	% of 2019 total	Change (ha) 2018 to 2019	% Change 2018 to 2019
Drip	1,775	1,905	58%	+130	+7%
Low level	895	895	27%	0	0%
Overhead	5	5	0%	0	0%
Furrow, flood	0	0	0%	0	0%
Vacant	480	480	15%	0	0%
Total hectares	3,155	3,285	100%	+130	+4%

Figure 57: Lock 10 to South Australia - irrigation methods from 2018 to 2019

3.7.6 Lock 10 to South Australia - salinity impact zones

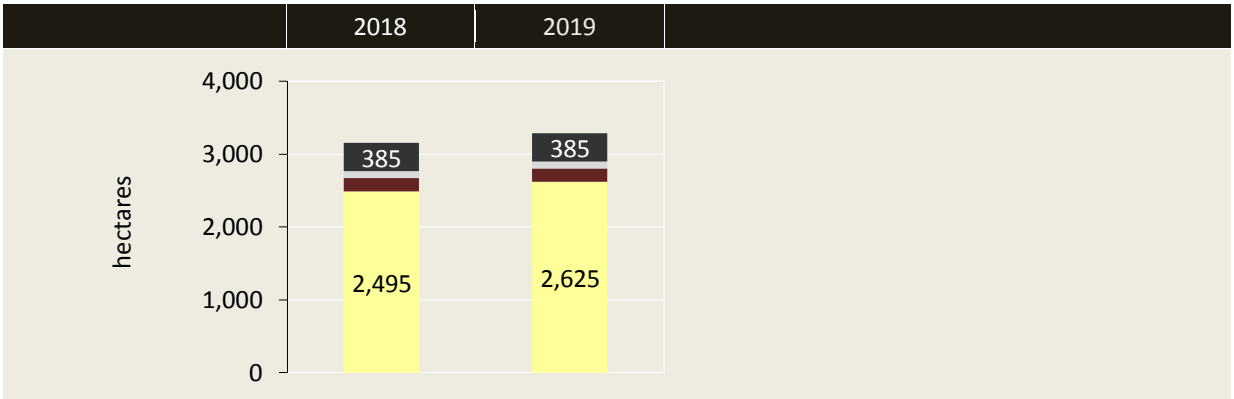
Figure 58 summarises the irrigable area in each salinity impact zone, in the Lock 10 to South Australia river reach, from 2018 to 2019.

From 2018 to 2019, the area irrigated in:

- L1 increased by 130 ha, a 5% increase from 2,495 ha to 2,625 ha.
- HIZ remained at 180 ha in 2018 and 2019.

From 2018 to 2019, the irrigable area in:

- L1 increased by 130 ha, a 5% increase from 2,590 ha to 2,720 ha.
- HIZ remained at 565 ha in 2018 and 2019.



Salinity impact zone		2018	2019	% of 2019 total	Change (ha) 2018 to 2019	% Change 2018 to 2019
Irrigated	L1	2,495	2,625	80%	+130	+5%
	L2	-	-	-	-	-
	L3	-	-	-	-	-
	L4	-	-	-	-	-
	HIZ	180	180	5%	0	0%
Not Irrigated	L1	95	95	3%	0	0%
	L2	-	-	-	-	-
	L3	-	-	-	-	-
	L4	-	-	-	-	-
	HIZ	385	385	12%	0	0%
Total (ha)		3,155	3,285	100%	+130	+4%

Figure 58: Lock 10 to South Australia - irrigable area in each salinity impact zone from 2018 to 2019