



2018/19 SUMMER CROP SURVEY

Gisborne District Council



ABSTRACT

The 2018/19 Summer Crop Survey report details the fourth survey of the summer crops grown throughout the Gisborne District.

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Executive Summary

The 2018/19 Summer Crop Survey is the fourth survey to detail the type, location and total area of different summer crops in the Gisborne district. A total of 23,949.6 hectares was surveyed, of which 14,862.1 hectares was recorded as summer crops (pasture and tilled land were excluded from this value). Twenty five main summer crop types were identified throughout the region and varied in abundance.

The Tairāwhiti Resource Management Plan (TRMP) has new rules for protecting freshwater that relate directly to intensively farmed stock, winter intensive grazing and commercial vegetable growing. Rules around cropping and intensive farming will come into effect by 1 May 2021. Areas posing a threat to water quality were identified across the region and were classified under each rule in the Freshwater chapter 6 of the TRMP. Section 3.3 analyses the 2018/19 summer crop water threats.

Dominant crops

- Maize and Sweetcorn were the most dominant crop types (6525.9 ha), followed by Squash (1805.7 ha), Citrus (1512.1 ha), Grapes (1489.9 ha), and Kiwifruit (486.3 ha).

Crops by location

- Poverty Bay Flats had the largest area of cropped land (14665.09 ha) with the most diverse summer crop varieties.
- East/Tolaga/Tokomaru Bay had the second largest area (2063.2 ha), followed by Te Karaka/Whatatutu (1884.7 ha), East Cape/Ruatoria (708.2 ha), and Motu/Matawai (149.1 ha).

Water Threat

- Crops surveyed were categorised as having a water threat if they triggered any of the applicable rules for cropping in the Freshwater Chapter 6 of the TRMP.
- Water threatened areas accounted for approximately 1473 hectares of the total area, amounting to only 6.2% of the total land surveyed.
- Water threats identified as not meeting the Permitted Activity standards were found to cover 1473 hectares of the total area, amounting to only 6.2% of the total land surveyed.

1.0 Introduction

The Environmental Science Team from Gisborne District Council has completed a survey of the summer crops grown throughout the Gisborne district for the 2018/19 summer seasons. This is the fourth consecutive year that the summer crop survey has been completed. The purpose of the survey is to identify the different types of summer crops being grown throughout the region that are intended for human and animal consumption. The survey outlines the area that the crops cover, and proximity to waterbodies.

The data from the survey is utilised in the management of the region's physical resources, as it helps to determine both water quality and quantity parameters. This information will then be used to monitor waterways, help develop farm environment plans, and inform the farming community and general public on crop types and trends.

The Environmental Science Team aims to gain a better understanding of the adherence of intensive farming operations to the setback rules in the Freshwater Chapter (C6) of the Tairāwhiti Resource Management Plan. This is of particular interest as there are new rules that relate directly to intensively farmed stock, and commercial vegetable growing.

1.1 Relationship to the Tairāwhiti Resource Management Plan (TRMP)

The Tairāwhiti Resource Management Plan (TRMP) has new rules for protecting freshwater that relate directly to intensively farmed stock, and commercial vegetable growing. The Plan also contains rules regarding setbacks for waterways, and for commercial vegetable growing. These new rules come under Section C6.2.9 of the Plan which relates to water quality and discharges to water and land. The rules have been implemented to ensure that any permanently flowing stream, modified water course, lake, wetland or Regionally Significant Wetland identified in G17 and Outstanding Waterbody identified in G18 of the Plan are protected for their values.

Rules regarding commercial vegetable growing will come into effect from 1 May 2021. There is a requirement for commercial vegetable growers and annual croppers to lodge a Farm Environment Plan with Gisborne District Council by 1 May 2021. The rules are included in **Appendix 1**.

Definitions Part E: Definitions of the TRMP

Intensive farming is defined as:

1. 'Intensively farmed stock, commercial vegetable growing or **cropping activities**'.

Cropping is further defined as:

1. 'Using an area of land in excess of 1 hectare to grow **annual crops** other than commercial vegetable crops. This definition does not include crops grazed on by animals from the same property'.

Commercial Vegetable growing is defined as:

1. 'Using an area of land greater than 1 ha for producing **vegetable crops** for human consumption'
2. 'This may be undertaken on a rotational basis, but managed as a single operation'.
3. 'It does not include perennial crops'

Farming is defined as:

1. 'A land-based activity for the production of livestock or plants and includes':
 - c) 'Plantation forestry, horticultural produce and **cropping**'.

2.0 Methods

The 2018/19 summer crop survey began on 7 January 2019 and finished on 30 January 2019. The survey took 23 days to complete, and was not conducted on consecutive days due to weather events and staff members being away/having a high workload.

The survey order included that the Poverty Bay flats were surveyed first, followed by the Te Karaka and Whatatutu areas, Motu/Matawai, and Tiniroto. The more eastern coastal areas that were surveyed included the area around Tolaga Bay, Tokomaru Bay, Ruatoria, Tikitiki, with the furthest point being Rangitukia. This is shown in figure 1.

The data was gathered on a hand held tablet which utilised an ArcGIS (Geographic Information System) software called Arc Collector. The data was entered systematically while driving throughout the region, and the crop type, activity (e.g tilled or planted), and proximity of the crop to a waterway was recorded. It was also noted whether or not the crop proximity (to a waterway) was a threat to the water quality.

In previous years, the summer crop survey has begun between the first two weeks of January and has been completed within the last week of that month. Therefore, this year's survey was also fulfilled within this period to enable crop identification to be maximised. Only a small proportion of the crops were hard to identify, as they were either out of viewing range, or had been eaten out. Photos were taken of these crops to help enlarge and identify the image and crop type back in the office. The crops that could not be identified were categorised as 'other', and following further investigation (at the office) some of these crops could be identified by observing which crop grew in that particular location during summer.

This specific method (where data was collected using Arc Collector software) is the second time it has been used for the summer crop survey, and was also utilised during the 2018 winter crop survey. Prior to this, previous surveys were carried out by recording the crop types onto printed aerial maps and then digitizing this data onto an interactive map available online using ArcMap software.

2.1 Survey Area

The same areas in the 2018/19 were surveyed to ensure accuracy when comparing results between years; this practice should remain consistent for future summer crop surveys.

Various changes were made to the Gisborne region survey areas. The Tiniroto region (which was previously its own locality) was included into the Poverty Bay Flats area, and the Te Karaka/Whatatutu region (which was previously included within the Poverty Bay Flats category) was separated as its own locality. The surveyed area is shown in figure 1; divided into five different localities in order to compare data between locations. These locations are:

1. Motu/ Matawai
2. East/ Tolaga/ Tokomaru
3. East Cape/ Ruatoria
4. Te Karaka/ Whatatutu
5. Poverty Bay Flats

Crop Survey Area

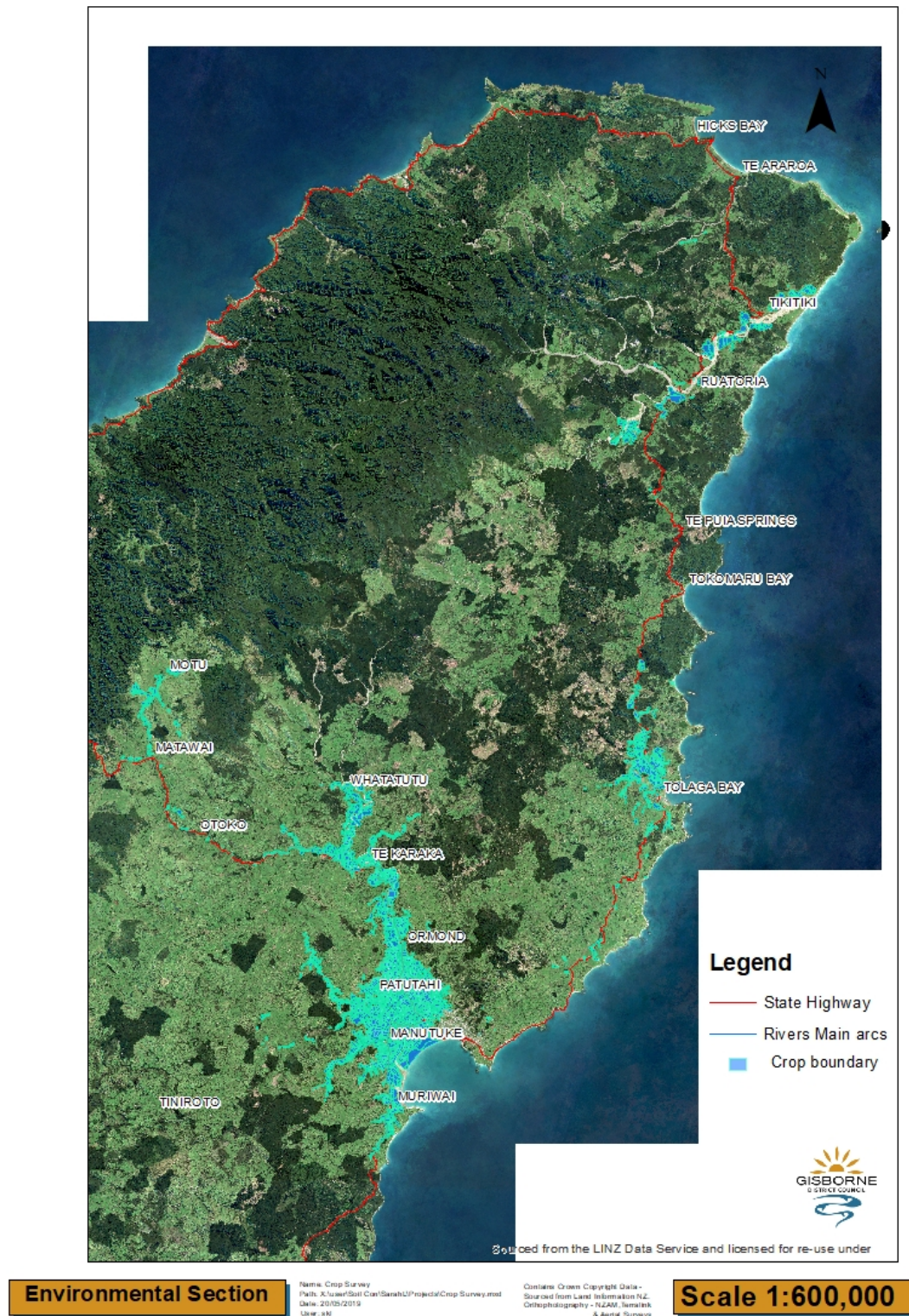


Figure 1. Aerial imagery (2017) showing average extent of area surveyed in the summer crop survey 2018/19.

2.2 Crop Types

This survey used a similar format for crop types as previous years. A full list of summer crop types that were recorded are shown in Figures 2 and 3. For additional spatial information refer to Figures 3 – 3D.

Pasture was recorded if it was in an area that had been cropped in the past, however this land was not categorised as a crop, it was categorised as ‘pasture/unused’. This data was further used in an analysis relating to water threat, as pasture can have a significant impact towards waterway quality. In previous reports ‘tilled land’ has been recorded but not used for analysis; however this year it has been included as part of the analysis in section 3.4 water threat.

Crops that were difficult to identify due to them being too far away, eaten out, or not categorised as a 2018/19 summer crop were recorded as ‘other’, see Figure 2. Plantain, chicory and clover were often planted with a variety of grasses or together, so they were recorded as a mix: chicory mix, chicory/plantain, plantain mix, and clover mix.

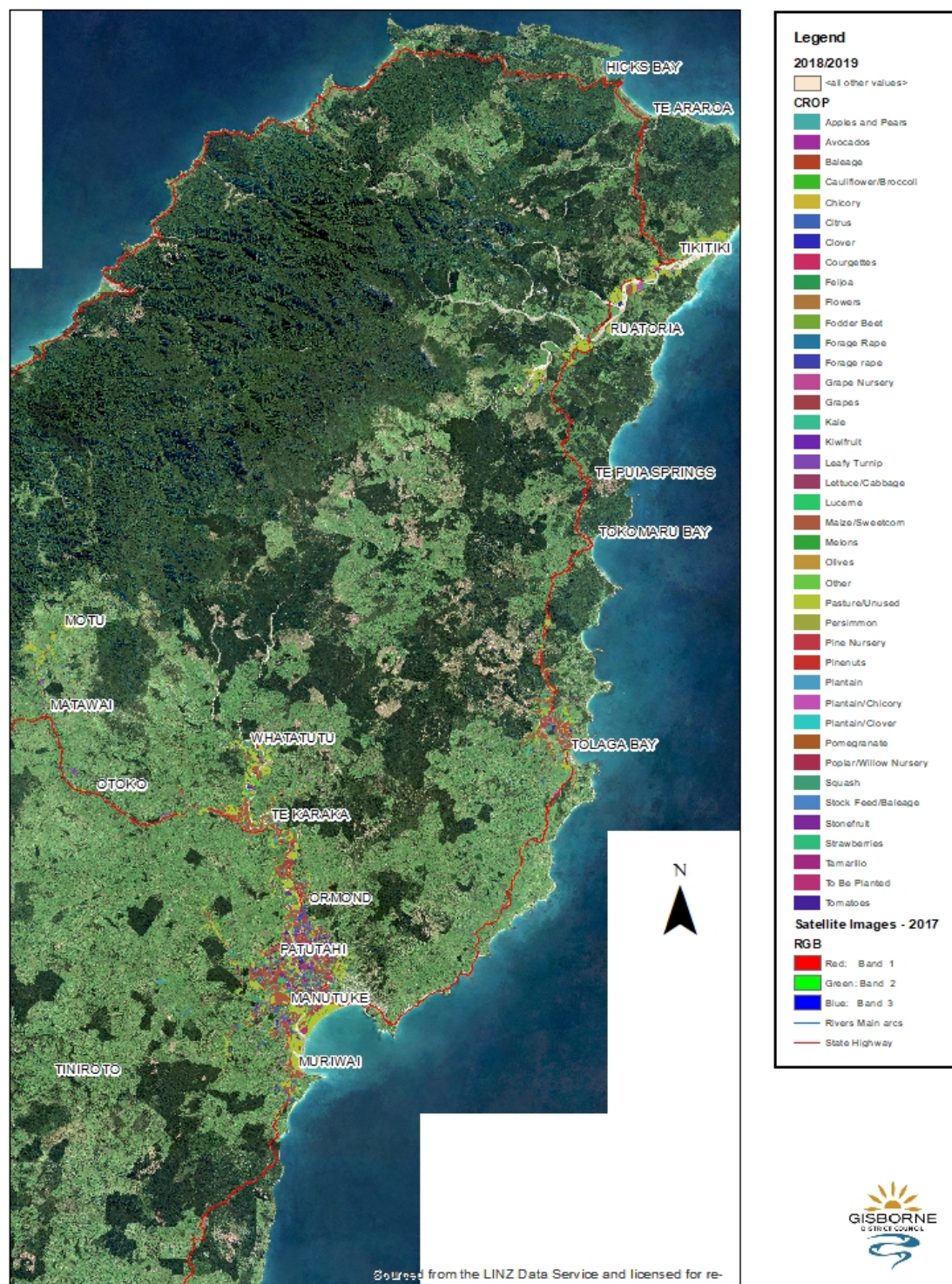
Figure 2. Crop Types

Surveyed

Apples and Pears	Pasture/Unused
Avocados	Persimmon
Baleage	Pine Nursery
Cauliflower/Broccoli	Pinenuts
Chicory	Plantain
Citrus	Plantain/Chicory
Clover	Plantain/Clover
Courgettes	Pomegranate
Feijoa	Poplar/Willow
Flowers	Nursery
Fodder Beet	Squash
Forage rape	Stock
Forage Rape	Feed/Baleage
Grape Nursery	Stonefruit
Grapes	Strawberries
Kale	Tamarillo
Kiwifruit	To Be Planted
Leafy Turnip	Tomatoes
Lettuce/Cabbage	
Lucerne	
Maize/Sweetcorn	
Melons	
Olives	
Other	

Figure 2. Crop types surveyed in the Gisborne District

Crop Type Maps



Environmental Section

Name: Crop Survey
Path: X:\user\Scott\GIS\Projects\Crop Survey.mxd
Date: 20/05/2019
User: sld

Contains Crown Copyright Data -
Sourced from Land Information NZ.
Orthophotography - NZAM, Terralink
& Aerial Surveys

Scale 1:600,000

Figure 3. Aerial imagery (2017) showing the crop types surveyed in the Gisborne District, showing all localities (Motu/Matawai, East/Tolaga/Tokomaru, East Cape/Ruatoria, Te Karaka/Whatatutu and the Poverty Bay Flats).

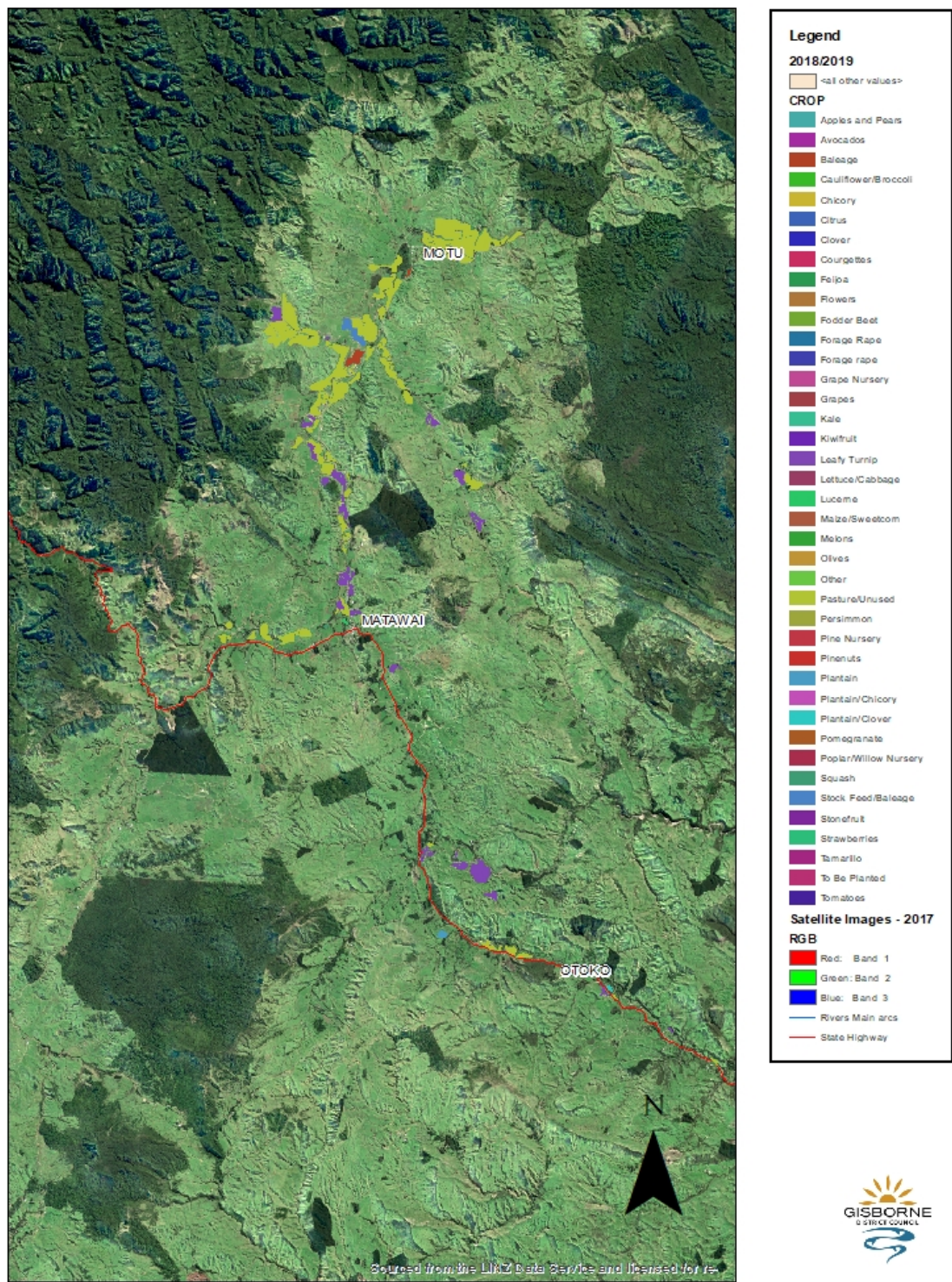


Figure 3B. Aerial imagery (2017) showing the crop types surveyed in the Gisborne District , Motu/Matawai locality.

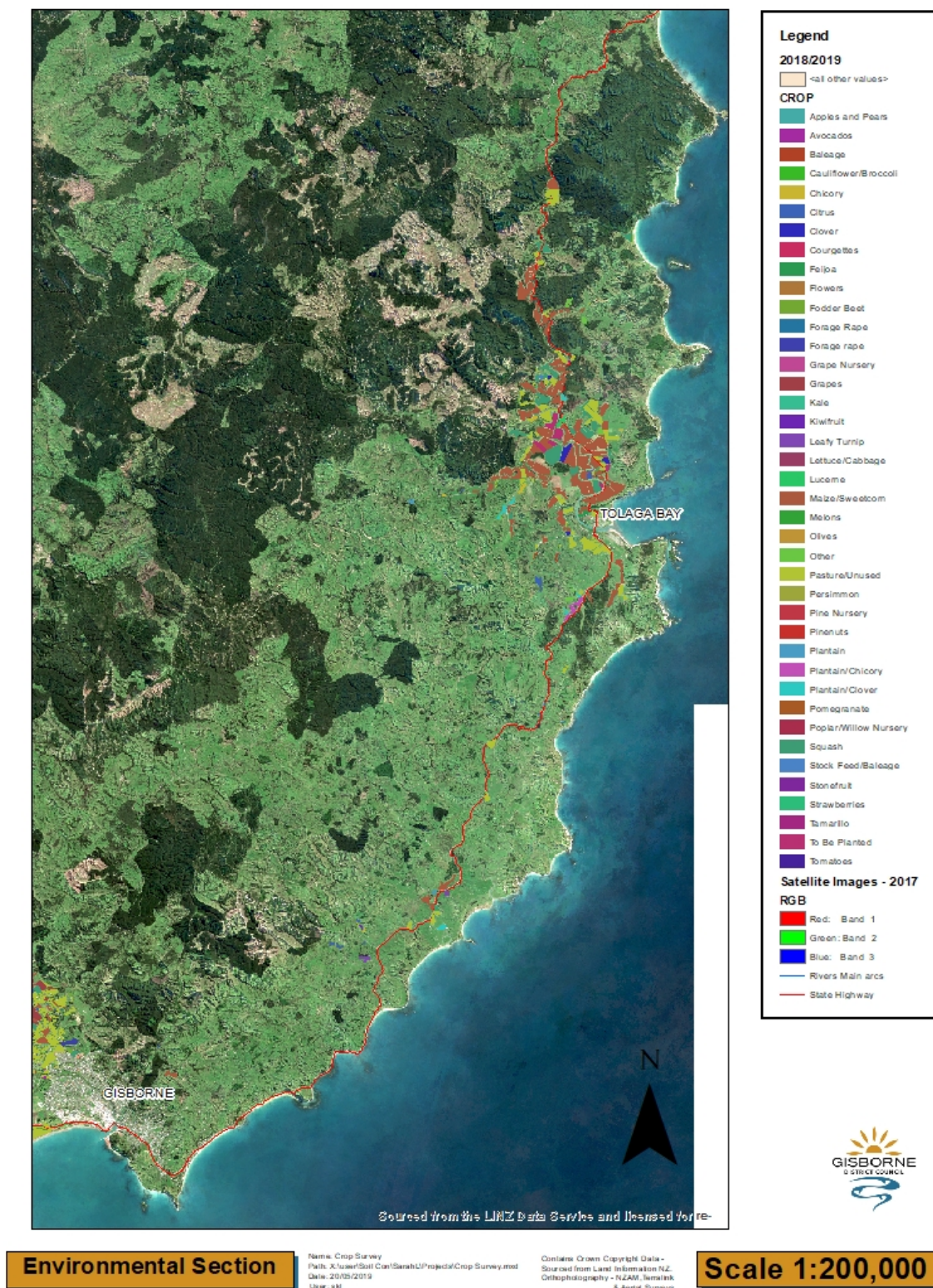


Figure 3C. Aerial imagery (2017) showing the crop types surveyed in the Gisborne District, showing the East Coast/ Tolaga locality.

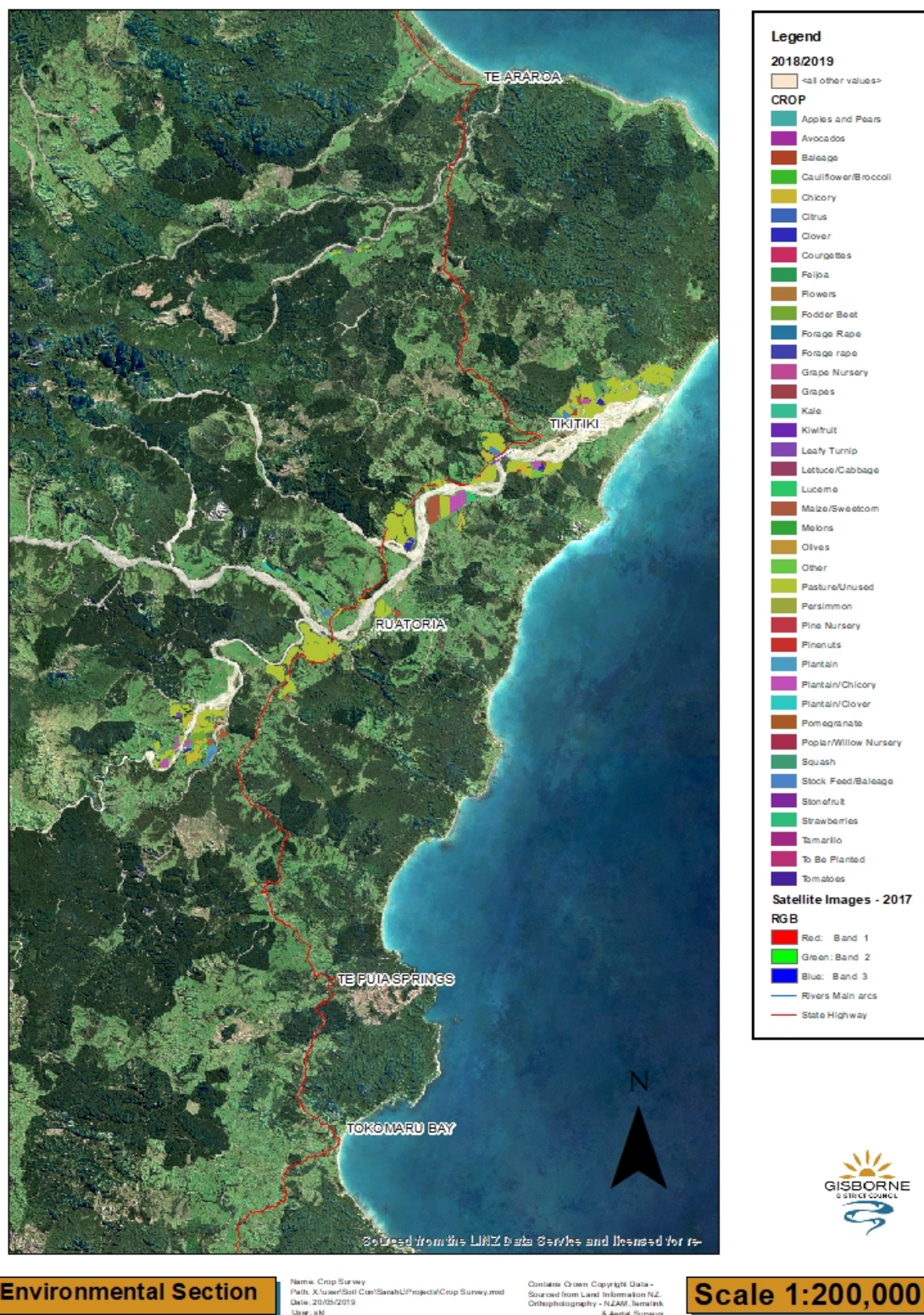


Figure 3D. Aerial imagery (2017) showing the crop types surveyed in the Gisborne District showing the East Cape/ Ruatoria locality.

3.0 Results

The results and discussion section compares trends and observations of major crop types. The same areas have been surveyed throughout all past summer crop surveys allowing accurate conclusions to be able to be drawn when discussing any changes or trends in crop types throughout the region.

For the entire Gisborne region, the area of summer crops excluding pasture and tilled land was **15,425 hectares**. The total area surveyed and recorded was **23,949.6 hectares**. The areas of pasture (8,391.9 ha) and tilled land (695.6 ha) were excluded to calculate the total area of summer crops as these land use types are generally not as intensely irrigated or fertilised as commercial crops. Pasture and tilled land is discussed and further analysed in the report in sections 3.4 and 3.5, as these crops pose a potential water threat.

A greater area was surveyed in the 2018/19 survey than the previous 2017 survey (23,948.9 ha). The 2018/19 survey also had a greater total area of summer crops (14,867.4 ha) compared to the 2017 survey of summer crops (14,475.7 ha). This may be explained by the increase of total surveyed land.

The 2018/19 survey had a reduced area of pasture (8,398.9 ha) compared to the previous survey (8,677.0 ha). This may be linked to the various pasture areas regarded as 'permanent' which were excluded in the 2018/19 survey. The area of tilled land was also reduced (696.9 ha) compared to the 2017 survey (796.2 ha).

The total area (ha) of the main 25 summer crops in the Gisborne region can be seen in Table 1 and Figure 4 below.

Table 1. Total area (ha) of main 25 crop types identified in the 2018/19 Summer Crop Survey.

Crop Type	Total area (ha)	Crop Type	Total area (ha)
Apple and Pear	343.0	Lettuce/Cabbage	144.9
Avocado	61.7	Lucerne	188.6
Baleage	92.7	Maize/Sweetcorn	6526.1
Cauliflower/Broccoli	65.1	Other	220.9
Chicory	304.8	Persimmon	113.5
Citrus	1513.2	Pine Nursery	48.8
Clover	151.6	Plantain	73.1
Feijoa	56.5	Plantain/Chicory	177.7
Fodder Beet	62.1	Plantain/Clover	99.5
Forage Rape	66.3	Squash	1805.7
Grape	1489.9	Stock Feed/Baleage	133.1
Kiwifruit	487.7	Tomatoes	209.0
Leafy Turnip	317.3	TOTAL	14752.8

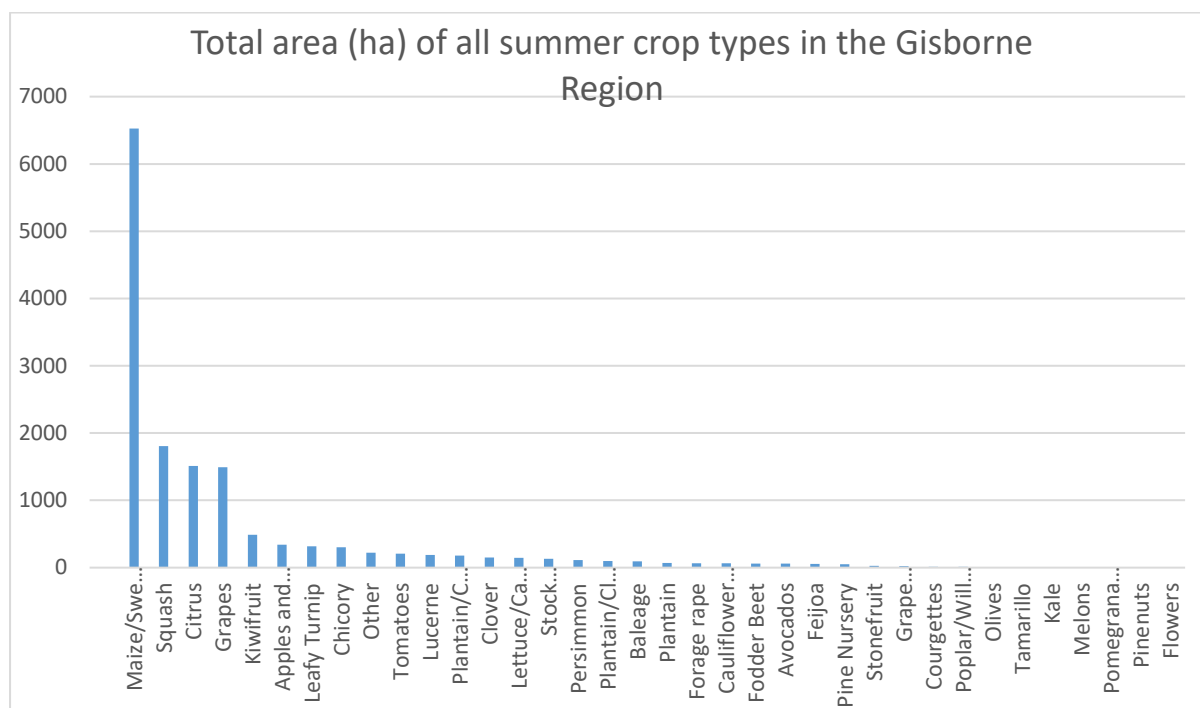


Figure 4. Total area (ha) of crop types identified in the 2018/19 Summer Crop Survey.

3.1 Major Crop Types

Table 2. Top five most common crops identified in Gisborne region

Crop Type	Total hectares
Maize/Sweetcorn	6526.1
Squash	1805.7
Citrus	1513.2
Grapes	1489.9
Kiwifruit	487.7

The results section shows observations and trends of major crop types. The major crop types were determined by the total area (hectares) they covered, and major crops can be seen in Table 2. The major crop types were analysed to test if there were any long term trends over the past four summers, these trends can be seen in Figure 5.

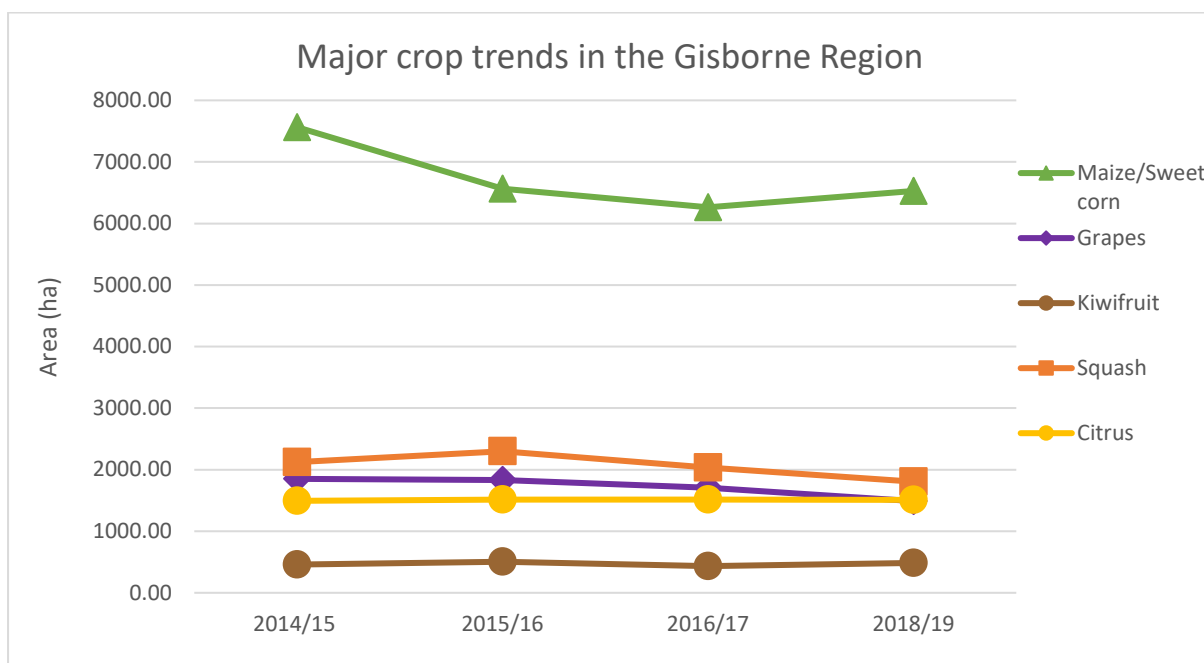


Figure 5. Four year trend of the top five crops in the Gisborne region (2014/15 – 2018/19)

3.1.1 Maize/Sweetcorn

Maize and Sweetcorn were the most abundant crop types present in the Gisborne region. Maize and Sweetcorn account for 43.9% of all crops recorded in the Gisborne region (excluding pasture), covering 6526.1 hectares of land. Maize and Sweetcorn were grouped together for the purpose of analysis as they were difficult to identify separately in some instances and pose very similar impacts on the environment and to water use.

Observations and trends:

The area of Maize and Sweetcorn have been compared to the past surveys and trends have been observed. The trend for the area of Maize and Sweetcorn is that it has decreased from 7564.3 ha in 2015 to 6564.2 ha in 2016 to 6262.9 ha in 2017. However it has increased to 6526.1 ha in 2018/19 differing from the exiting decreasing trend, as seen in Figure 6.

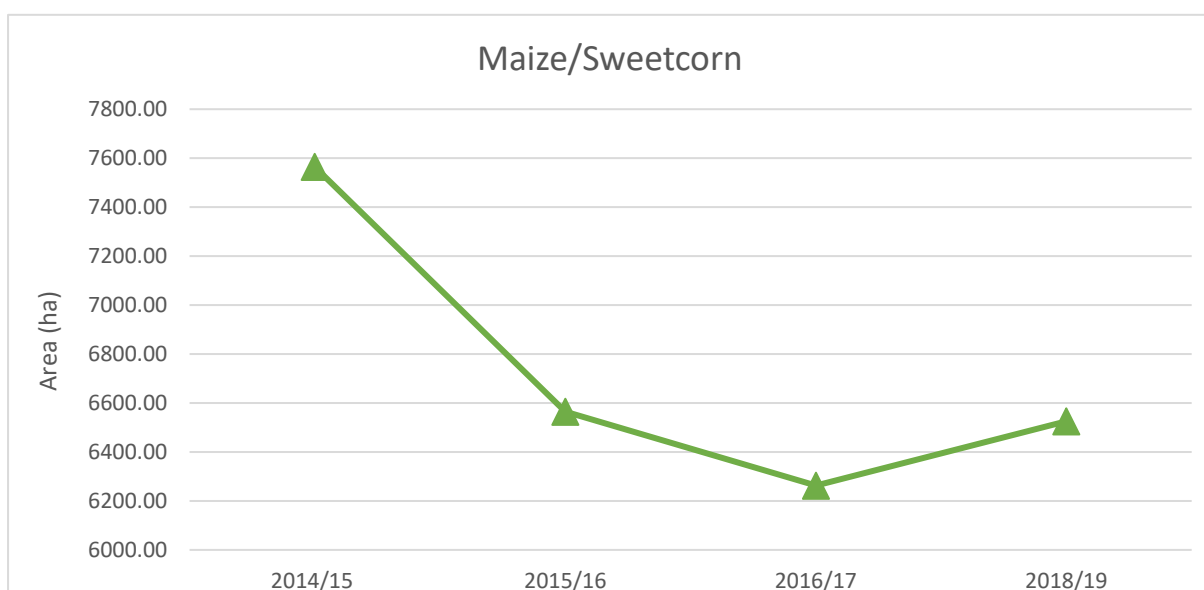


Figure 6. Four year trend of the total area (ha) of Maize/Sweetcorn in the Gisborne region (2014/15 – 2018/19)

3.1.2 Squash

Squash was the second most abundant crop type identified in the Gisborne region, covering an area of 1805.7 hectares. Squash crops are squash/gourd type crops that were too difficult to identify by an untrained eye. The Squash category covers a range of various Buttercup Squash and Pumpkin crops which account for 12.15% of the summer crops recorded in 2018/19.

Observations and trends:

The area of Squash crops have been compared to the previous summer crop surveys and trends have been observed. Squash crops recorded have decreased in area from 2299.2 ha in 2016 to 2035.3 ha in 2017 to 1805.7 ha in 2018/19, as seen in Figure 7.

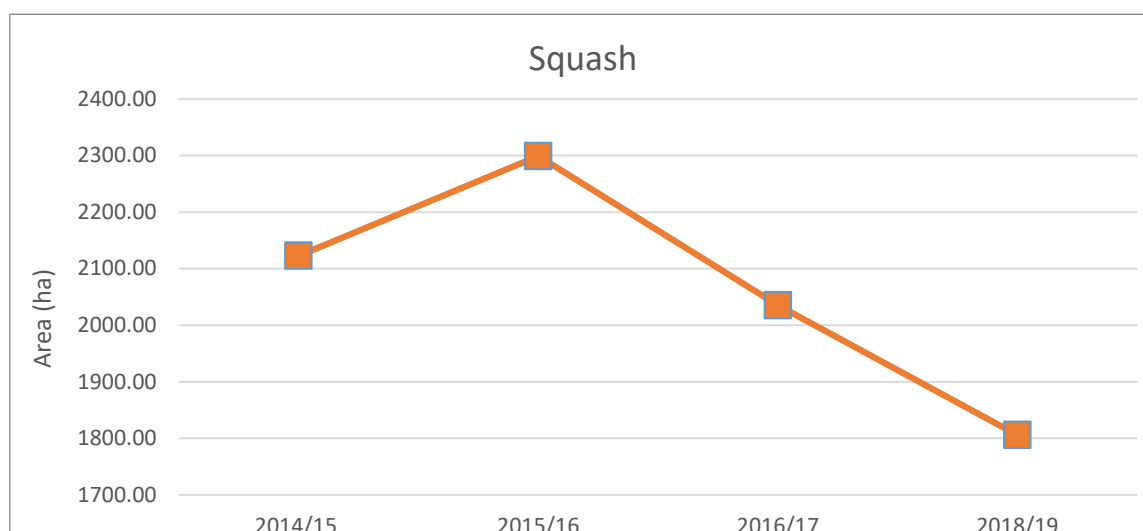


Figure 7. Four year trend of the total area (ha) of Squash in the Gisborne region (2014/15 – 2018/19)

3.1.3 Citrus

The total area of citrus crops observed at the time of the survey was 1,513.2 hectares. There are a number of citrus crops grown in the summer months of the Gisborne region. These commercial crops include Orange, Lemon, Mandarin, Lime and Grapefruit. These citrus varieties were grouped together as they were difficult to distinguish, mainly due to dense shelter belts that prevented a clear view of the citrus types. Mature citrus trees are also very similar in appearance. These crop categories combined contribute to 10.18% of the total summer crops recorded in the region.

Observations and trends:

This commercial crop category trend has remained very similar over the past three years with 1513.93 ha recorded in 2015; 1513.77 ha in 2016; and 1513.22 in 2018/19. The total area for these summer commercial fruits in all four of the summer crop surveys can be seen in Figure 8.

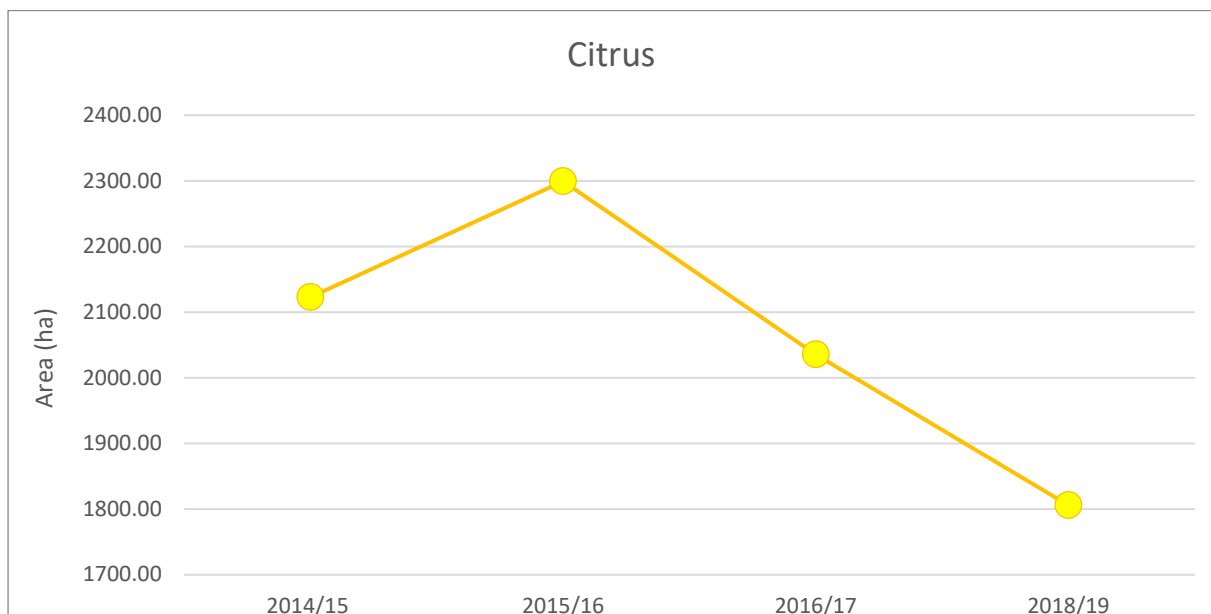


Figure 8. Four year trend of the total area (ha) of Citrus in the Gisborne region (2014/15 – 2018/19)

3.1.4 Grape

Grape is another common crop identified in the Gisborne region. The area of Grapes recorded covered 1489.9 ha making it the fourth most abundant summer crop in the region, accounting for 10.02% of the total summer crops surveyed in the region.

Observations and trends:

The area of Grapes has been compared to the previous summer crop surveys and trends have been observed. Grapes have shown a decreasing trend in area covered, 1851.1 ha in 2015, to 1829.7 ha in 2016, to 1704 ha in 2017, and in 2018/19 a total of 1489.9 ha was measured, as seen in Figure 9.

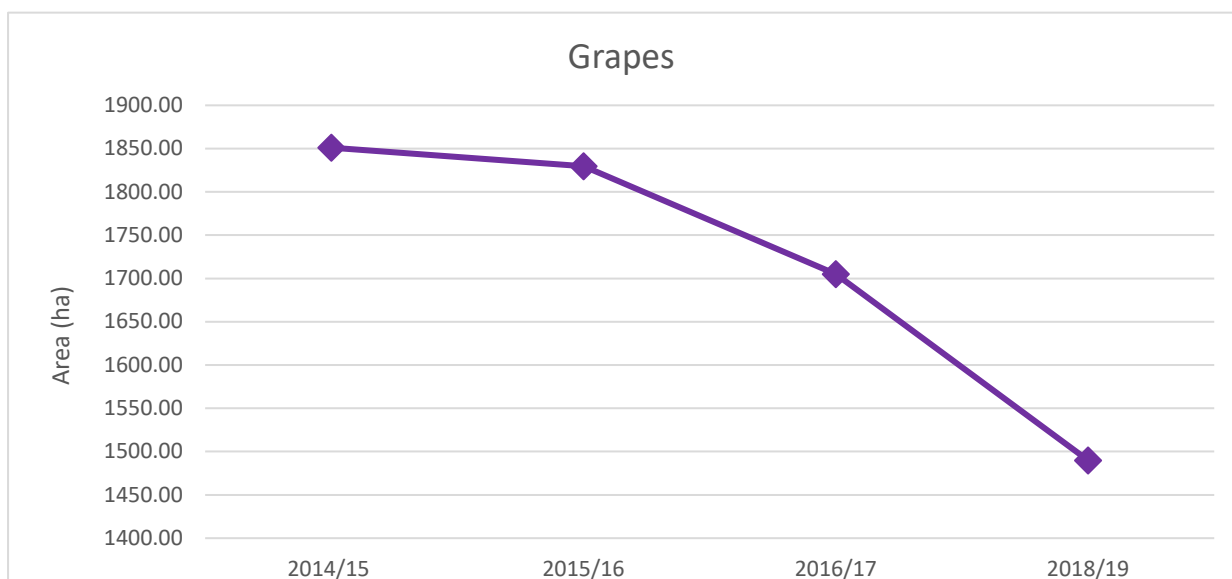


Figure 9. Four year trend of the total area (ha) of Grapes in the Gisborne region (2014/15 – 2018/19)

3.1.4 Kiwifruit

Kiwifruit is another common crop identified in the Gisborne region. The area of Kiwifruit recorded was 487.7 ha, making it the fifth most abundant crop in the region contributing to 3.28% of the summer crops recorded in the Gisborne region.

Observations and trends:

The area of Kiwifruit has been compared to the previous summer crop surveys and has shown no obvious trends. Kiwifruit has been fluctuating in area from 457.8 ha in 2015; 504.9 in 2016; 433.5 ha in 2017; to 487.7 ha in 2018/19, as seen in Figure 10.

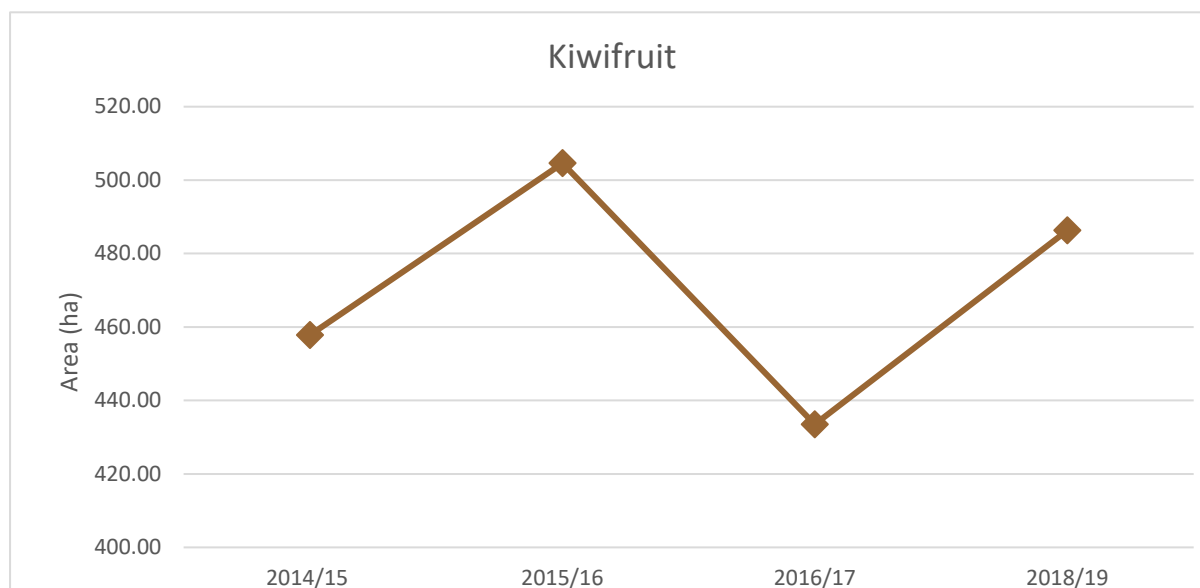


Figure 10. Four year trend of the total area (ha) of Kiwifruit in the Gisborne region (2014/15 – 2018/19)

3.2 Location

3.2.1 The Poverty Bay Flats

The total surveyed area for the Poverty Bay Flats region was 14,697.0 hectares. The total area of pasture (4073.1 ha) and tilled land (567.0) was excluded to calculate the total area of summer crops, which is 10,056.9 hectares. This area had the largest amount of crops in the district. The total area of crops largely declined from the 2017 survey which had a total of 14,475.7 hectares of summer crops. However this may be due to the Te Karaka and Whatatutu regions being separated from The Poverty Bay Flats as their own category in the 2018/19 survey. The crop types found in this area can be seen in Figure 11.

The major crop type found in this region was Maize and Sweetcorn with 3949.8 hectares. Citrus was the second most abundant crop in this area with 1448.2 hectares followed by Grapes with 1446.9 hectares then Squash with 1142.7 hectares. Kiwifruit was found to be the fifth most common crop in the region covering 446.0 hectares of land.

Crop Types - Poverty Bay Flats (ha)

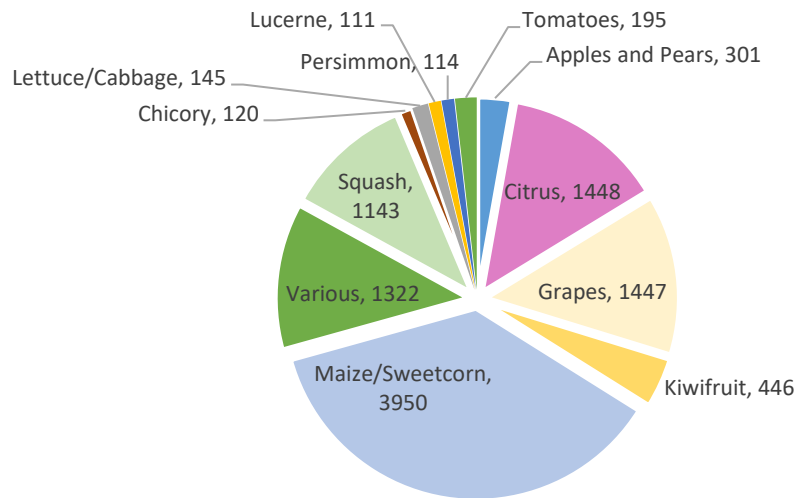


Figure 11. Crop Types recorded on the Poverty Bay Flats in ha

In this example 'Various crops' were identified as crops with low hectares that contributed to less than 2% of the total crop area in the 2018/19 Summer Crop Survey. Various crop types for the Poverty Bay Flats region are included in Figure 12.

Various crop types in the Poverty Bay Flats

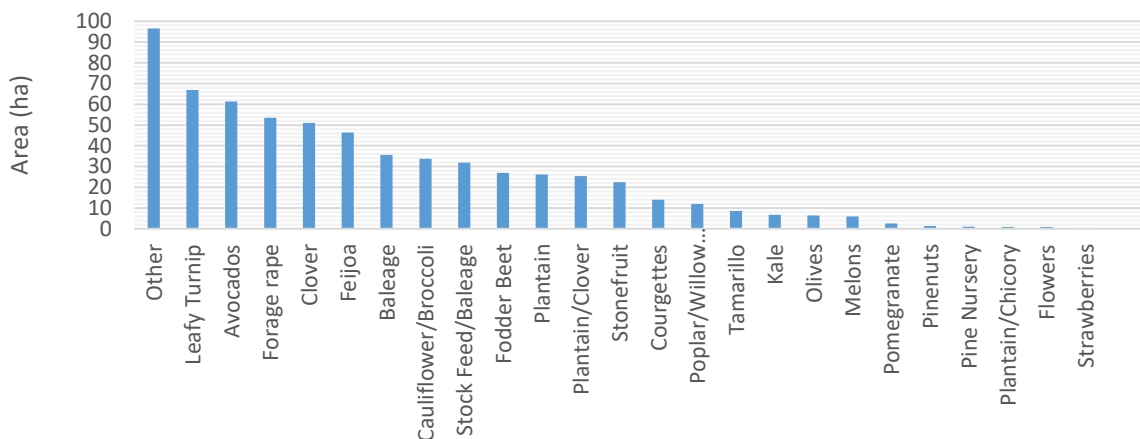


Figure 12. Various crop types in the Poverty Bay Flats breakdown.

3.2.2 East Cape/Ruatoria

The total surveyed area for the East Cape/Ruatoria region was 2441.8 hectares. The area of pasture (1733.6 ha) and land area that was tilled (0 ha) were excluded to calculate the total area of summer crops, which was 708.2 hectares, making this the fourth largest area of crops in the district. The total area of crop types found in this area can be seen in Figure 13. The most abundant crop in this area is Maize and Sweetcorn with 147.8 hectares, followed by Chicory crops with 140.4 ha. Plantain and Chicory crop are the third most abundant crop with 136.7 ha. The remaining crops including Baleage, Citrus, Clover, Fodder Beet, Leafy Turnip, Lucerne, Olives, Plantain, Plantain/Clover, Poplar/Willow Nurseries, Other, and Stock feed/Baleage were found in much lower quantities.

Crop Types - East Cape/ Ruatoria area (ha)

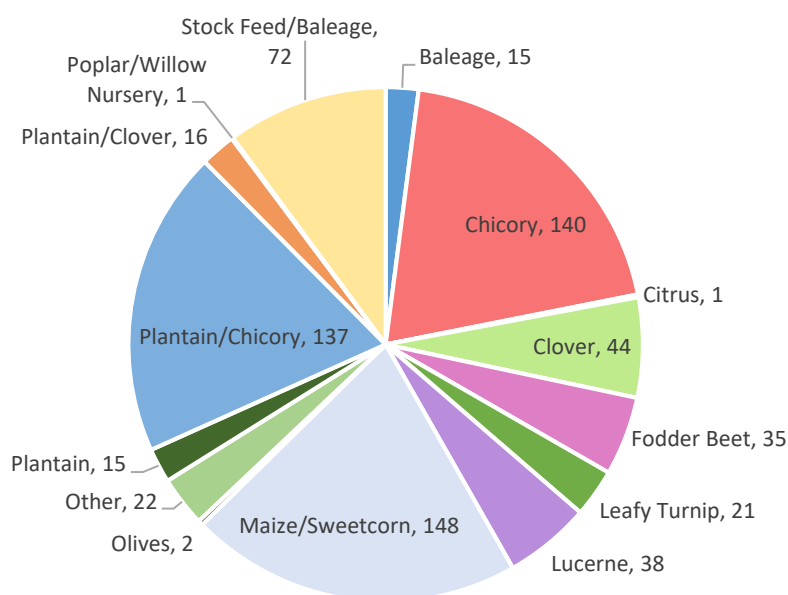


Figure 13. Crop Types recorded in the East Cape/ Ruatoria area in hectare

3.2.3 East/Tolaga/Tokomaru

The total area surveyed for the East/Tolaga/Tokomaru area was 2720.4 hectares. The area of pasture (561.0 ha) and land area that was tilled (96.2 ha) was excluded to calculate the total area of summer crops, which was 2063.2 hectares, making this the second largest area of crops in the district. The total area of crop types found in this area can be seen in Figure 14. The major crop type found in this region was Maize and Sweetcorn with a total area of 1418 hectares. Squash was the second most abundant crop type in this region with a total area of 336.5 hectares. The remaining crops including Baleage, Chicory, Citrus, Clover, Feijoa, Forage Rape, Grapes, Kiwifruit, Leafy turnip, Lucerne, Other, Plantain, Plantain/Clover, Plantain/Chicory, Stock feed/Baleage, and Stone fruit were found in much lower quantities.

Crop Types - East/Tolaga/Tokomaru area (ha)

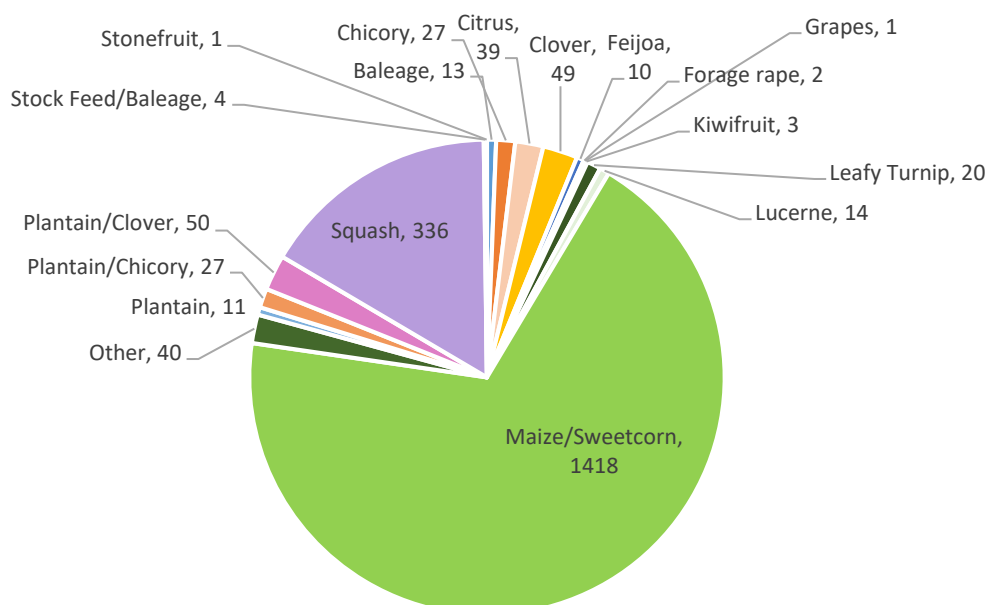


Figure 14. Crop Types recorded in the East/Tolaga/Tokomaru area in ha.

3.2.4 Motu/Matawai

The total area surveyed for the Motu/Matawai area was 772 hectares. The area of pasture (623 ha) and the area of tilled land (0 ha) was excluded to calculate the total area of summer crops, which was 149.1 hectares, making this the smallest area of crops in the district. The total area of crop types found in this area can be seen in Figure 15. The major crop type found in this region was Leafy Turnip, which had 111 hectares of the crop. Other crop types found in the region were Stock feed/Baleage with 18 hectares, Baleage with 17 hectares, Lucerne with 2 hectares and Squash with 1 hectare.

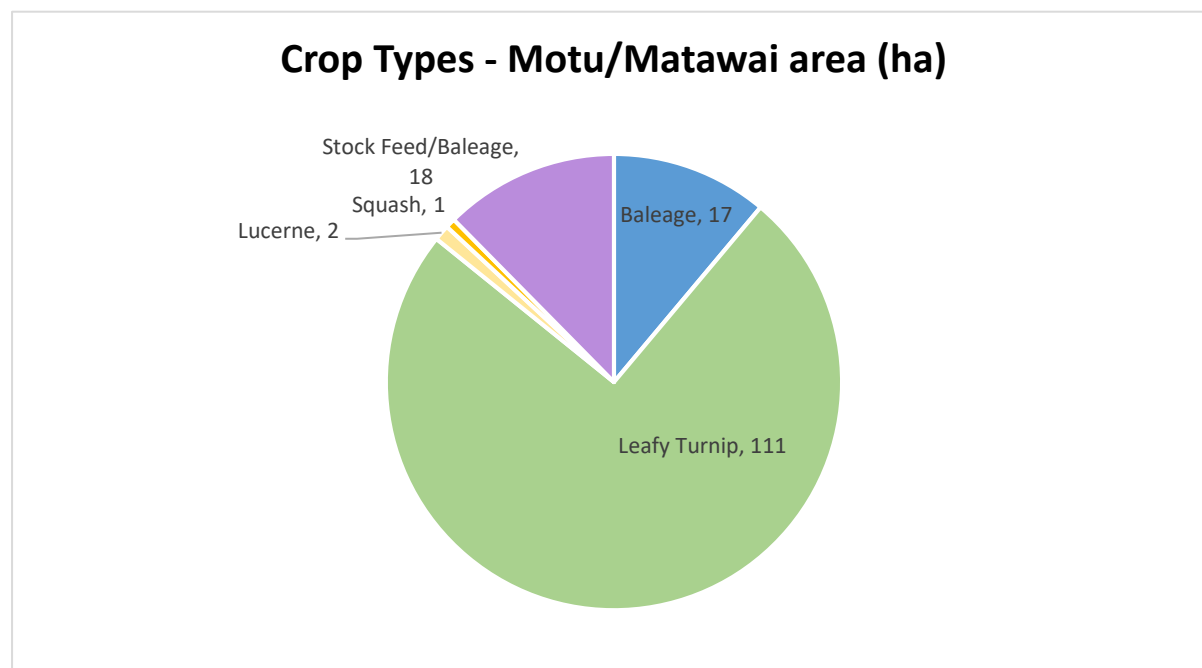


Figure 15. Crop Types recorded in the Motu/Matawai area in ha.

3.2.5 Te Karaka/Whatatutu

The total area surveyed for the Te Karaka/Whatatutu area was 3318.4 hectares. The area of pasture (1401.3 ha) and tilled land (32.4 ha) were excluded to calculate the total area of summer crops, which was 1884.7 hectares, making this the area the second largest area of crops in the district. The total area of crop types found in this area can be seen in Figure 16. The major crop type found in this region was Maize and Sweetcorn with a total area of 1010 hectares. The second most abundant crop type was Squash with a total of 325.4 hectares, followed by Leafy Turnip being the third most abundant crop at 98 hectares. Pine Nursery, Kiwifruit, Apples and Pears, Grapes, and Various crop types were also found in the region in lower abundance.

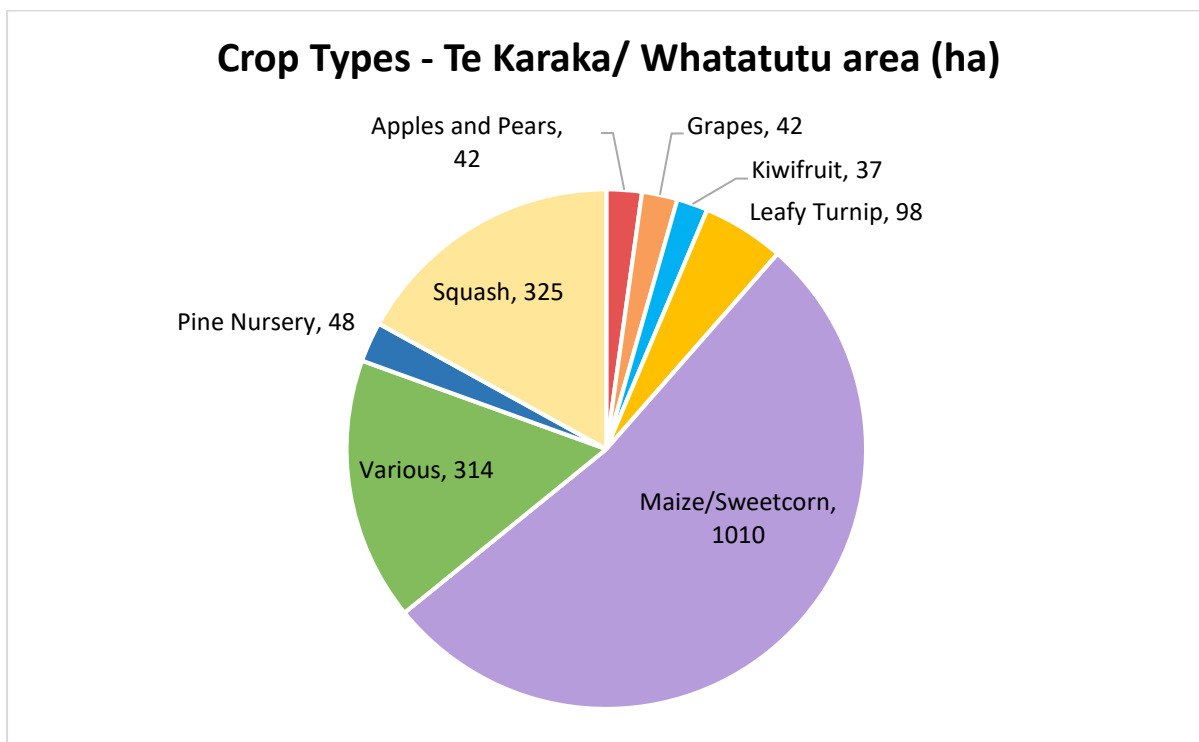


Figure 16. Crop Types recorded in the Te Karaka/ Whatatutu area in hectares.

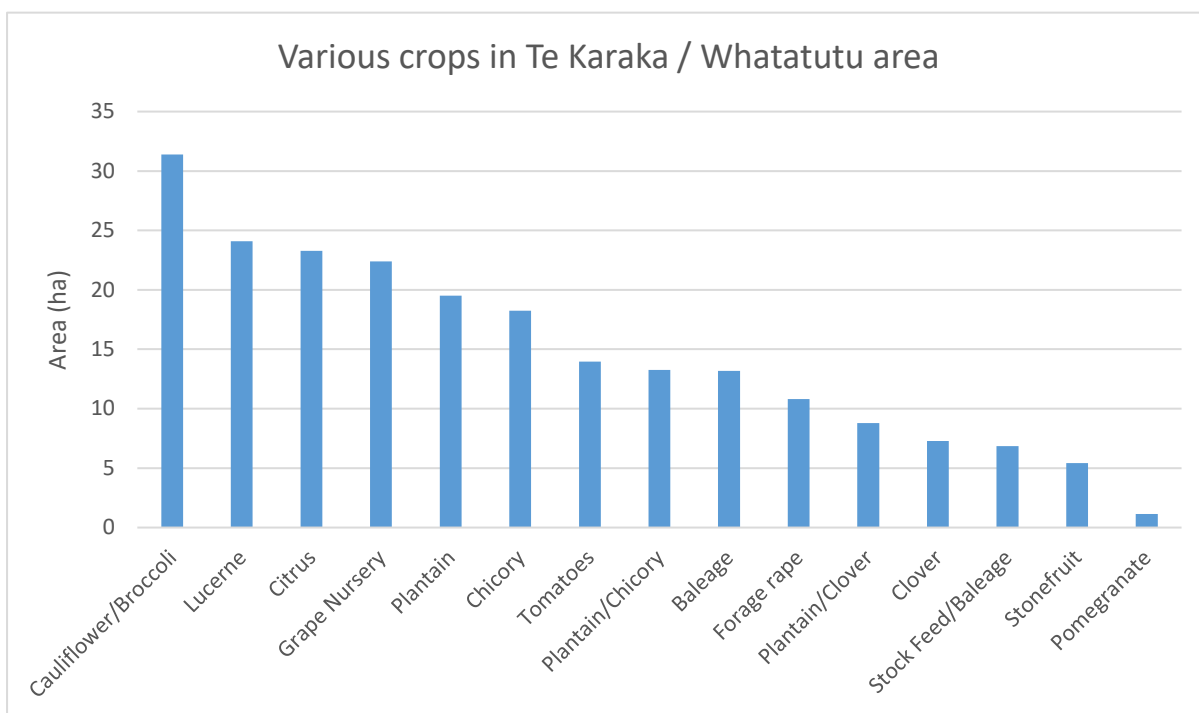


Figure 16.1 Various crop types breakdown for the Te Karaka and Whatatutu area

3.3 Threat to water

Crops were identified as having a threat to water if they triggered any of the relevant rules for cropping in the Freshwater Chapter C6 of the TRMP. The water threat relates to rules 6.2.9(2), 6.2.9(3), 6.2.9(4) and 6.2.9(5) of the TRMP, see **Appendix 1**. Crops that were listed with no water threat did not trigger any of the rules of the TRMP.

Paddock drains were considered a water threat in this survey as they come under the category of being a modified watercourse under the TRMP definitions, see **Appendix 2**. Modified watercourses will be influenced by the setback requirements under rule 6.2.9(3) which comes into place from 1 July 2021 where no cultivation is to be undertaken within 5 metres of the edge of any modified watercourse, permanent or intermittent stream. Therefore future non-compliant sites have been identified in this survey to input into management actions and Farm Environment Plans leading up to 2021.

The total area that was classed as having a water threat was 2571 ha. This comprises 11% of the total area surveyed. Each of the categories are shown in Figures 17, 18 and 19 below. These included cultivation <5m edge of a modified watercourse or stream (Rule 6.2.9(3)/6.2.9(4), cultivation <10m PFS, RSW, AEWB, Rule 6.2.9(2), and paddock drain.

Water threats identified as not meeting the Permitted Activity standards were found to cover 1473 hectares of the total area, amounting to only 6.2% of the total land surveyed.

For the majority of areas identified as having water threat (2,571 ha), the rules will not come into effect until 1 July 2021, which allows farmers time to adjust their practices to comply with the new rules.

It is to be noted that the total area of water threat does not reflect the area of the setback required but instead shows the total area of cropped land that is adjacent to the water body.

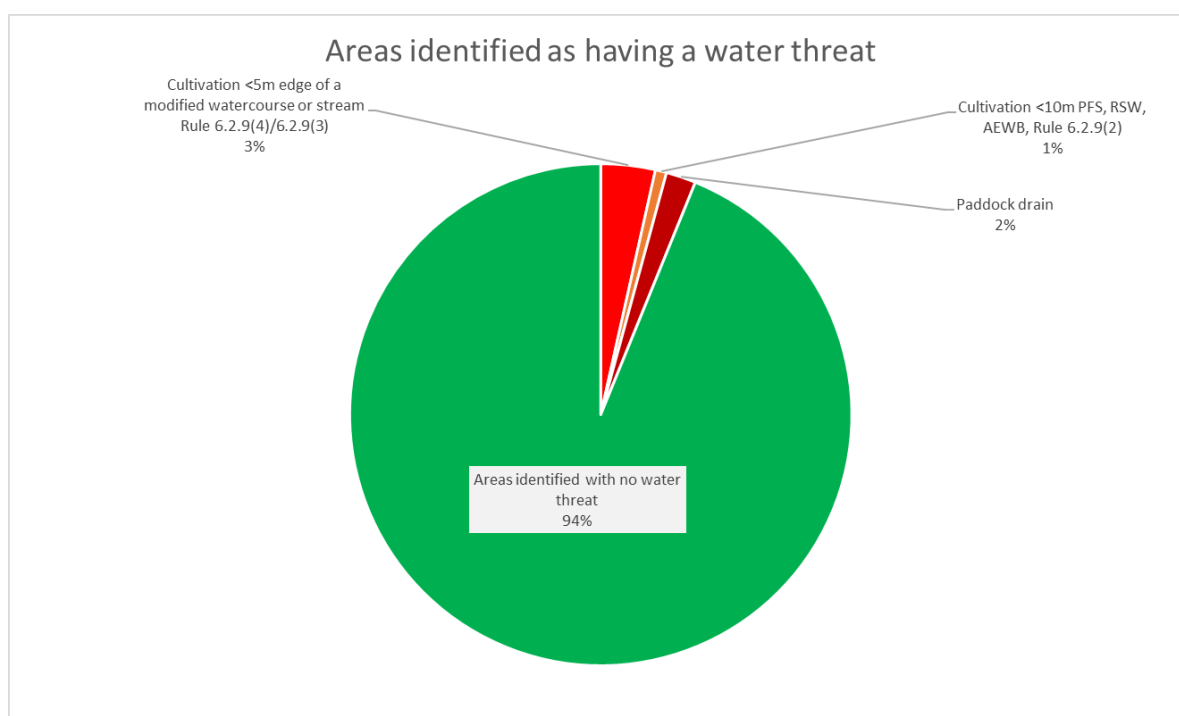


Figure 17. Proportion of land area triggering rules within the Freshwater Chapter of the Tairāwhiti Resource Management Plan – identified as a water threat.

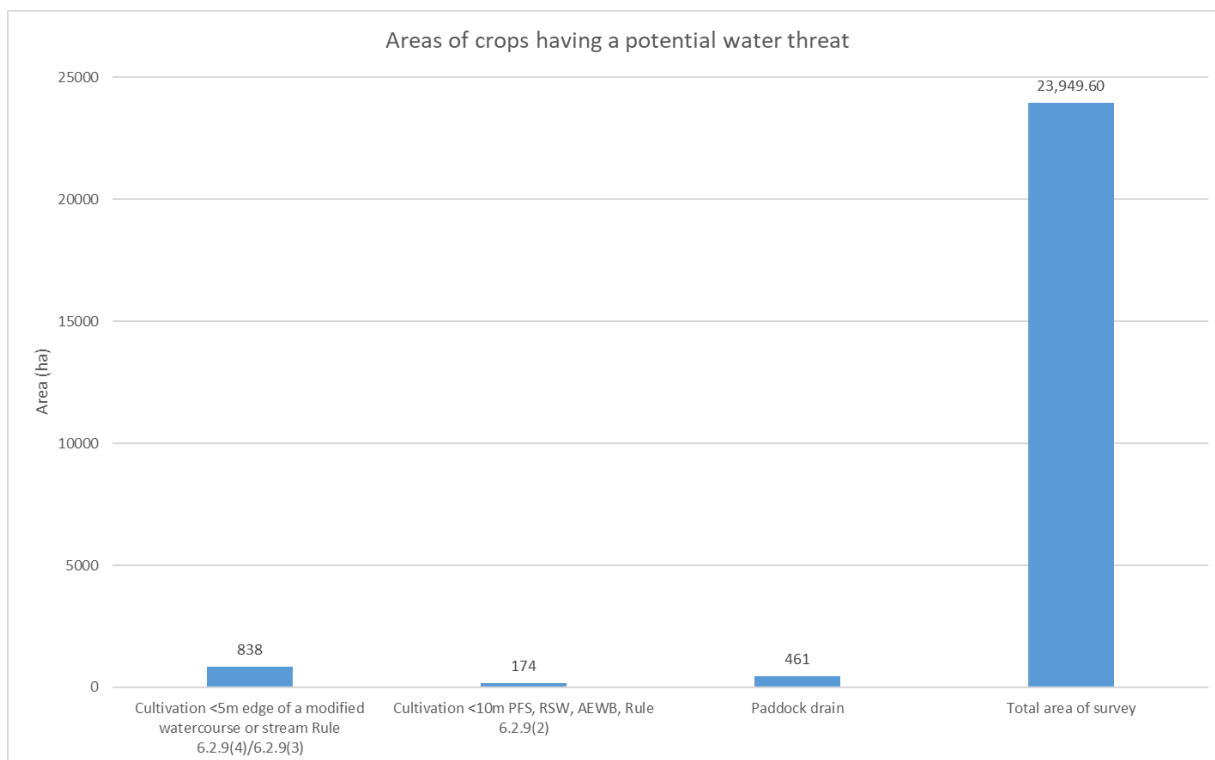


Figure 18. Proportion of land area triggering rules within the Freshwater Chapter of the Tairāwhiti Resource Management Plan – identified as a water threat.

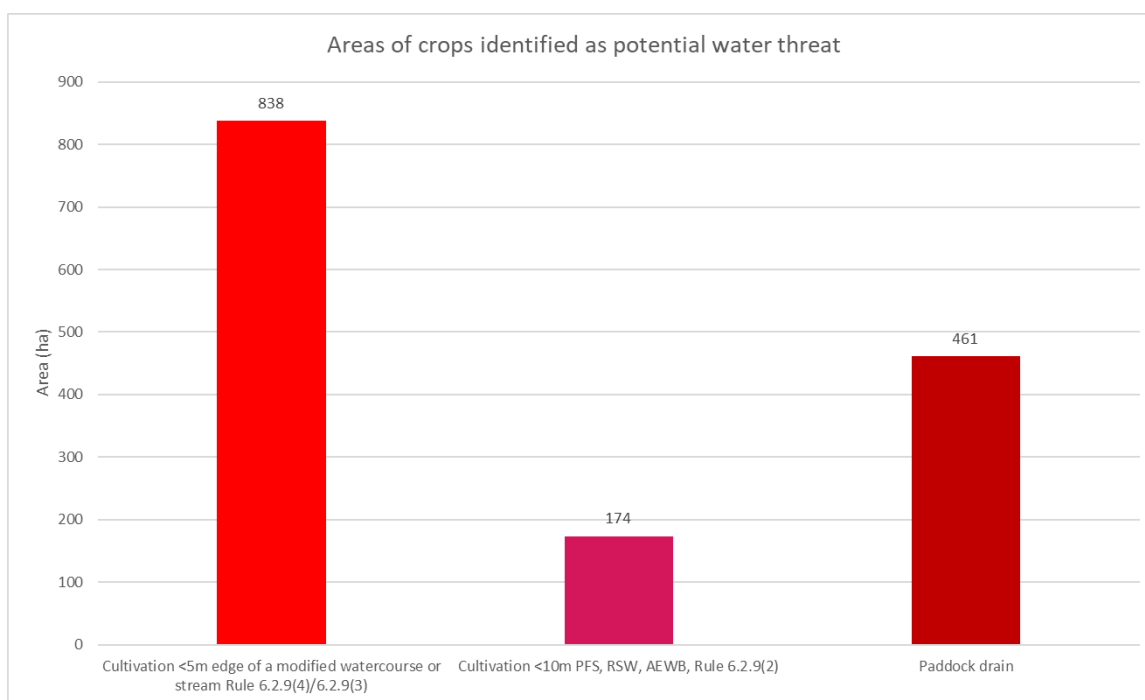


Figure 19. Proportion of land area triggering rules within the Freshwater Chapter of the Tairāwhiti Resource Management Plan – identified as a water threat.

Abbreviations include:

- PFS = Permanently Flowing Stream
- RSW = Regionally Significant Wetland
- AEWB = Aquatic Ecosystem Waterbody

The most common water threat rules triggered, Rule 6.2.9(4) and 6.2.9(3) 'Cultivation <5m edge of a modified watercourse or stream' accounted for 3% of the total area identified as a water threat. The second most common rule triggered, Rule 6.2.9(4) 'Cultivation <10m Permanently Flowing Stream, Regionally Significant Wetland and Aquatic Ecosystem Waterbody' accounted for 1% of the total area identified as water threat, whereas 'Paddock drains' made up 2% of the water threat.

The water threats within the 2018 Winter Crop Survey can be compared to this report as it is also based on the rules of the Freshwater chapter (C6) of the Tairāwhiti Resource Management Plan (TRMP). However the 2018 results may differ due to seasonal fluctuations in rainfall and climatic conditions, as well as variation in crop types grown during this time of year.

The 2018 Winter survey showed that the most common water threat rules triggered were Rules 6.2.9(4) and 6.2.9(3) 'Cultivation <5m edge of a modified watercourse or stream' accounted for 89.3% of the total area identified as a water threat. The second most common rule triggered was Rule 6.2.9(4) 'Cultivation <10m Permanently Flowing Stream, Regionally Significant Wetland and Aquatic Ecosystem Waterbody' which made up 9.1% of the total area identified as water threat. This differs from the 2018/19 Summer survey, as the percentage of total areas identified as water threats was substantially lower during summer compared to the winter results. This may be attributed to either improved management practices, or seasonal variations in both climate and crop type which may have influenced the distance between the crop and water body.

A conservative approach was taken when identifying potential water threats, as the rules these threats breach will not come into effect until 2021. The guidelines and definitions for water threats can be quite general or vague; therefore improvements to watercourse definitions and threat identification may lead to a better estimate of the total land that is non-compliant. The purpose of recording these breaches is to gain a rough scale of non-compliance in the region so that a plan can be created for future management of these water threats. It was also noted there was a slight trend in non-compliance water threats in the rural regions. Frequency of water threats seemed to increase with distance from the town areas, which is possibly simply due to these areas being less exposed and monitored.



Figure 20. *Possible non-compliant cropping area.*

4.0 Limitations

4.1 Survey Area

As previously stated in section 2.0 the 2018/19 summer crop survey is the second survey to be conducted in the Gisborne region following this method, however the Poverty Bay Flats region has been surveyed individually since the 2007/08 summers. The survey area is outlined in Figure 1 in section 2.1. These cover all visible cropping areas that can be seen by the road throughout the region.

Although the localities are delineated in section 2.1, it was sometimes difficult to distinguish which location the crop belonged to, especially at the boundary between two locations. Figures 3-3D spatially show the extent of both crop presence and type throughout each of the five localities surveyed.

Another limitation was the possibility of hidden watercourses on properties that had a limited view of the entire area. This was usually due to land ridges or the distance from the road. Communication with land owners prior to surveying may assist with these issues, and further strengthen survey accuracy.

The survey area was limited by public road access, therefore the survey does not cover the entire Gisborne region as it only surveys crops visible from the road. Using the Council's drone, or any other variation of remote sensing could be used to overcome this limitation however this would be much more expensive and potentially more time consuming. It is recommended that the same areas should be surveyed each summer, to keep trends as accurate as possible.

Recent aerial photography will be useful to identify any new cropped areas, which can be analysed using GIS Software.

4.2 Survey Method

As stated in section 2.0, this was the second year that the summer crop survey was done by using a hand held tablet rather than recording on aerial maps. This year it was found easier for just one person to drive and pull over when identifying and recording an area of cropped land in the Poverty Bay Flats region, as it was a densely cropped area with a relatively small size. However two people were necessary in the rural areas which required longer periods of driving between distanced crops. A second person in the vehicle reduced the amount of stops during the trip and increased survey efficiency. An additional person also acted as a safety measure as driving long distances in rural areas could be potentially hazardous.

The software used to collect the crop data was Arc Collector. Using Arc Collector the team was able to edit the GIS layer from the previous crop survey. Editing the previous layer allowed the survey to be completed a lot more efficiently as most crops remained the same as the previous year. If the crop type had changed but the paddock shape remained the same, the crop type could be easily changed without drawing in a new paddock every time. This method also reduced the time of the survey as the digitising was done in the field, so no further work was needed to be completed after the survey. The winter crop 2018/19 Survey will also follow this data collection method.

Digitising the data not only reduced the time of the survey, it also increased the accuracy of the results. The ability to use a smaller scale allowed a detailed description of crop boundaries, by increasing the view of the paddocks and removing obstructions such as patches of bush, houses, sheds, shelter belts, and river edges.

The survey time could also be reduced by excluding non-summer crops, such as pasture and tilled land which covered a large portion of the land surveyed (9087.5 ha). Pasture was only recorded if the land area had previously been documented as having summer crops present. Pasture and tilled land are important to record due to their potential threat to water quality. Tilled land exposes bare land, increasing the likelihood of sediment running off the paddocks into nearby waterways. If survey time needed to be decreased, it is recommended that only recording pasture and tilled land that has a water threat is a suitable option.

The 2018/19 summer crop survey began on 7 January and was finished on 30 January, around the same dates as the 2015 and 2016 surveys. In previous years, the summer crop survey has always begun on a date between the first two weeks of January and has been completed within the last week of that month. The timing of the summer crop survey significantly impacts the results, as the survey only supplies a 'snapshot' of what crops are present during the time of the survey. Fodder crops are planted and eaten out at different times of the year due to either weather or economic factors.

The area of land requiring Farm Environment Plans – which includes maize, tilled and other crops – includes the entire 23,949.60 hectares of the survey area. The primary areas that should complete FEP's initially should include the areas that have water threats, which is 1473 ha of land. Leading up to 2021, all cropping areas will require FEP's.

Areas requiring Farm Environment Plans by 2021:

Crop type / Land use	Area (ha)
Maize	3949.84
Tilled / pasture	4073.07
Crops – excluding Maize and Tilled / pasture	6642.18

5.0 Conclusion

In summary the 2018/19 Summer Crop Survey can conclude that out of the total 23,949.6 hectares of land that was surveyed, 14,862.1 hectares was recorded as summer crops (pasture and tilled land were excluded from this value). Maize and Sweetcorn were the most dominant crop types (6525.9 ha), followed by Squash crops (1805.7 ha), Citrus (1512.1 ha), Grapes (1489.9 ha), and Kiwifruit (486.3 ha).

These values showed that a large area of land is being utilised during the summer period for cropping practices. Water threatened areas that did not comply with the Freshwater Rules accounted for approximately 1473 ha of the total area, amounting to only 6.2% of the total land surveyed. These areas can particularly be targeted in the lead up towards the implementation of the 2021 Freshwater rules coming into practice, and will assist in the development of Farm Environment Plans.

The purpose of this survey has been to outline the land use patterns within the Gisborne district and to promote sustainable land use practices. This can be achieved through the identification of water threatened areas, as well as the location of cropping activities, which will enable the Environmental Science team to promote water and land quality management actions in the coming years.

Rule 6.2.9(2)

- a) From **1 May 2021**, intensively farmed stock activities shall have prepared and submitted to the Consent Authority a Farm Environment Plan which has been certified by the Consent Authority as meeting the requirements outlined in Appendix H20. All dairy farming and intensively farmed stock activities shall be carried out in accordance with the actions and timeframes specified in the certified Farm Environment Plan. An annual report will be provided to the Consent Authority on the implementation of the Farm Environment Plan; except that
- b) Where the area of dairy farming or intensively farmed stock is less than 5 hectares, a Farm Environment Plan is not required provided that the activity complies with the following standards:
- i. Where the land slope is less than 15 degrees, no establishment of feed crops or irrigation of pasture is undertaken within 5 metres of the top of the bank of any permanently flowing stream, lake or wetland and within 10 metres of the top of the bank or edge of any Outstanding Waterbody identified in Schedule G18 or Regionally Significant Wetland identified in Schedule G17. A smaller setback of at least 1 metre can only occur where a Farm Environment Plan is prepared that demonstrates that this smaller setback will not adversely impact on the quality of receiving waterbody and this is certified by the Consent Authority;
 - ii. Where the land slope is between 15 and 25 degrees, no establishment of feed crops or irrigation of pasture is undertaken within 10m of any permanently flowing stream, lake or wetland. A smaller setback of at least 1 metre can only occur where a Farm Environment Plan is prepared that demonstrates that this smaller setback will not adversely impact on the quality of receiving waterbody and this is certified by the Consent Authority;
 - iii. No feed crops are established on land with a slope greater than 25 degrees;
 - iv. No cultivation occurs within 1 metre of open surface water drains.
- c) From **1 July 2017**, where dairy farming or intensively farmed stock activities are within a paddock adjoining a waterbody, all livestock shall be excluded from 5 metres from the top of the bank or edge of any permanently flowing stream, lake or wetland, and within 10 metres of the top of the bank or edge of any Aquatic Ecosystem Waterbody identified in Schedule G15, any Outstanding Waterbody identified in Schedule G18 or any Regionally Significant Wetland identified in Schedule G17;
- d) From **1 July 2019**, all permanent and intermittent streams and rivers that are crossed by formed stock crossings as part of the intensively farmed stock activity shall be bridged or culverted. However, cattle, deer and pigs are able to enter waterbodies for the purpose of crossing from one side to the other provided:
- i. They are being supervised and are actively driven across the water body in one continuous movement; and
 - ii. This occurs less frequently than once per week.

Advisory Note: The discharge of dairy farm effluent to land is a discretionary activity in accordance with Rule C6.2.3(14).

Farm Environment Plans will be assessed by the Consent Authority for compliance with the information requirements in Appendix H20. If a Farm Environment Plan which meets the Appendix H20 requirements is not produced by the **1 May 2021** then existing intensively farmed stock activities will require a resource consent to continue.

Diffuse discharges from dairy farming and intensively farmed stock activities lawfully established prior to 14 October 2015.

Classification: Permitted Activity

Stock access to the beds of rivers and lakes including stock crossings are also subject to Rules C6.3.7(1) and C6.3.7(2).

Rule 6.2.9(3)

Diffuse discharges from commercial vegetable growing and cropping activities lawfully established prior to 14 October 2015.

Classification: Permitted Activity

*From **1 May 2021** onwards all commercial vegetable growing and cropping activities shall have prepared and submitted to the Consent Authority a Farm Environment Plan which has been certified by the Consent Authority as meeting the requirements outlined in Appendix H20. All commercial vegetable growing and cropping activities shall be carried out in accordance with the actions and timeframes specified in the certified Farm Environment Plan. An annual report shall be provided to the Consent Authority on the implementation of the Farm Environment Plan;*

*b) From **1 July 2021**, no cultivation is undertaken within 5 metres of the edge of any modified watercourse, permanent or intermittent stream, except where the Farm Environment Plan can demonstrate that a smaller setback of at least 1 metre can occur without adversely impacting on the quality of receiving waterbody and this is certified by the Consent Authority.*

Advisory Note: *Farm Environment Plans will be assessed by the Consent Authority for compliance with the information requirements in Appendix H20. If a Farm Environment Plan which meets the Appendix H20 requirements is not produced by the **1 May 2021** then existing commercial vegetable growing and cropping activities will require a resource consent to continue.*

Advisory Note: *Refer to the definitions of Intermittent Stream and Modified Watercourse as many “drains” are likely to meet these definitions and the requirements of the rule.*

Rule 6.2.9(4)

Diffuse discharges from new commercial vegetable growing, cropping, dairy farming and intensively farmed stock activities established after 14 October 2015 except where they are within 20 metres of an Outstanding Waterbody identified in Schedule G18.

Classification: Permitted Activity

a) A Farm Environment Plan which has been certified by the Consent Authority as meeting the requirements outlined in Appendix H20 must be prepared and submitted to the Consent Authority prior to the commencement of the activity. All commercial vegetable growing, cropping, dairy farming and intensively farmed stock activities must be carried out in accordance with the actions and timeframes specified in the certified. An annual report shall be provided to the Consent Authority on the implementation of the Farm Environment Plan;

b) Where dairy farming or intensively farmed stock activities are within a paddock adjoining a waterbody, all livestock shall be excluded from 5 metres from the top of the bank or edge of any permanently flowing stream, or the edge of any lake or wetland, or within 10 metres of the top of the bank or edge of any Aquatic Ecosystem Waterbody identified in Schedule G15, or any Regionally Significant Wetland identified in Schedule G17, or within 20 metres of any Outstanding Waterbody identified in Schedule G18;

c) All permanent and intermittent streams and rivers that are crossed by formed stock crossings as part of the intensively farmed stock unit shall be bridged or culverted. This must be done by 1 July 2019 or when the activity is established if after this date. However, cattle, deer and pigs are able to enter waterbodies for the purpose of crossing from one side to the other provided:

- i. They are being supervised and are actively driven across the water body in one continuous movement; and*
- ii. This occurs less frequently than once per week;*

d) No cultivation is undertaken within 5 metres of the edge of any modified watercourse, permanent or intermittent stream, unless the Farm Environment Plan can demonstrate that a smaller setback of at least 1 metre can occur without adversely impacting on the quality of receiving waterbody and this is certified by the Consent Authority.

Rule 6.2.9(4)

Classification: Discretionary

Diffuse discharges that do not meet the permitted activity standards for the rules in section C6.2 or is not provided for by another rule in this Plan.

Definitions

Modified watercourse -

1. *A watercourse that meets any of following criteria:*

- *is a river or stream that has been channelled or diverted.*
- *is a drain (as defined in this Plan) constructed through a wetland or swamp, that generally follows the path of a historic natural watercourse or reasonably defined natural drainage channel.*
- *is a watercourse that has a natural headwater of either a channel or spring, and generally follows the path of a historic natural watercourse or reasonably defined natural drainage channel is the oxbow of a diverted river.*

Drain – *Any natural channel which has been modified to lower the water table or divert water.*