2022/23 SUMMER CROP SURVEY

Gisborne District Council

ABSTRACT

The 2022/23 Summer Crop Survey report details the eighth survey of the summer crops grown throughout the Gisborne District.

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Executive Summary

The 2022/23 Summer Crop Survey is the eighth survey to detail the type, location and total area of different summer crops in the Gisborne district. A total of 24,354.1 hectares (ha) was surveyed, of which 13,252.5 hectares were recorded as summer crops. Summer crops are all crops excluding pasture/unused, not-visible and to-be-planted/tilled land.

The Tairāwhiti Resource Management Plan (TRMP) rules for protecting freshwater relate directly to intensively farmed stock, winter intensive grazing and commercial vegetable growing. Rules around cropping and intensive farming came into effect on the 1st of May 2021. Areas posing a threat to water quality were identified across the region and were classified under each rule in the Freshwater Chapter C6 of the TRMP.

Dominant summer crops

- Maize and sweetcorn were the most dominant crop types (5,785.5 ha), followed by grapes (1,584.2 ha), citrus (1,549.9 ha), kiwifruit (798.6 ha), Chicory (671 ha), apples and pears (603.7 ha), and squash (370.3 ha).

Crops by location

- Poverty Bay Flats had the largest area of summer cropped land (9,409.5 ha) (excluding pasture, not visible and to be planted) with the most diverse summer crop varieties.
- East Coast/Tolaga/Tokomaru had the second largest area (1738.1 ha), followed by Te Karaka/Whatatutu (1,575.6 ha), East Cape/Ruatoria (407.9 ha), and Mōtū/Mātāwai (121.4 ha).

Taruheru Catchment

- Recent reports by the council such as the State of Environment and Freshwater Accounting reports have identified the Taruheru River as having low water quality.
- The Summer Crop Survey 2022/23 looks at long term trends in commercial cropping in the Taruheru Catchment.
- Trends found that the total area of cropping (excluding pasture, not visible and to-be planted/tilled land) fluctuated over time but an overall increase from 2624.5 hectares in 2007/08 to 3645 hectares in this years (2022/23) survey.
- Maize and sweetcorn had the greatest cropping area in both 2007/08 and the 2022/23 summer crop survey, Kiwifruit has shown the largest increase since 2007/08 increasing from 136.7 hectares to 336.1 hectares in 2022/23, Tomatoes have shown the largest decrease dropping from 257.1 hectares in 2007/08 to 13.2 hectares in 2022/23, and Squash has shown a large change decreasing from 306.6 hectares in 2007/08 to 81.6 hectares this year (2022/23).

Water Threat

- Crops surveyed in the Gisborne region were categorised as having a water threat if they triggered any of the applicable rules for cropping in the Freshwater Chapter C6 of the TRMP.
- Areas that pose a threat to waterways are all crops excluding pasture and permanent crops.
- 4,530.8 hectares of land in the Gisborne region has been recognised as having a threat to water, this was 19.2% of total surveyed area, and 43.3% of the cropped area which has a potential threat to water (excluding pasture and permanent crop area). Another 21% of area was “not-visible” and therefore the water threat potential cannot be determined.

1.0 Introduction

The Gisborne District Council's Environmental Science team has completed a survey of the commercial summer crops grown throughout the Gisborne district for the 2022/23 summer season. This is the eighth 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/or animal consumption. The survey outlines the area that each type of crop covers, and proximity to waterbodies.

The data from the survey is utilised in the management of the region's physical resources. It will 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 TRMP. 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

The 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 commercial cropping from waterways. 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 applied 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 came into effect on the 1st of May 2021. The rules are included in ***Appendix 3***.

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':
    - 'Plantation forestry, horticultural produce and **cropping**'.

2.0 Methods

The 2022/23 Summer Crop Survey began on the 4th of January 2023 and finished on the 24th of January 2023. The survey took 15 working days to complete over 21 days. Consequently, the survey was not conducted on consecutive days due to the weekends. Ex-cyclone Hale caused some disruption to the survey resulting in this year's survey taking slightly longer than last year's survey which was completed within 13 working days (2021/22).

The East/Tolaga/tokomaru area was surveyed first, followed by East cape/Ruatoria, Mōtū/Mātāwai, Te Karaka/Whatatutu, and Poverty Bay Flats. The more northern coastal areas that were surveyed included the area around Ruatoria and Te Araroa, which was the furthest point north (figure 1).

The data was gathered on a handheld tablet which utilised an ArcGIS (Geographic Information System) software called Arc Collector. The data was entered systematically while driving throughout the region, noting crop type, and activity (e.g. to-be-planted/tilled or planted). The proximity of the crop to a waterway was recorded based on the setback rules in the Freshwater Chapter C6 of the TRMP. The regions waterways have been included in the ArcGIS aerial base layer with the significant waterways highlighted in blue. This assisted in determining if waterways were present and/or significant.

A significant portion of waterways in relation to the crop were out of view. In these cases, 'not-visible' was chosen as the cultivated cropping option. In some cases where waterways were involved but not visible, the Aerial base layer on ArcGIS was utilised. If cultivation appeared to be breaching the relevant rules stated in the freshwater chapter C6 of the TRMP then the aerial base layer was used to estimate distance and a note was taken for this to be confirmed.

Similarly, only a small proportion of the crops were not identified as they were either out of viewing range, or a hybrid/unidentifiable species.

If crops were not visible a pair of binoculars were utilised for identifying some crops that the naked eye could not. If the crop was still not able to be identified, the crop was categorised as 'not-visible'. If the crop could be seen but not identified, it was categorised as 'other/unknown'.

This year (2022/23), like last year (2021/22) the survey began in the first two weeks of January and was completed by the last week of the month. Therefore, the crop survey was fulfilled within the same cropping period to enable crop identification to be maximised and to allow for accuracy when comparing past crop surveys

This specific method where data was collected using Arc Collector software, has been used for the summer crop surveys for a total of five years now. It was also utilised during the 2018 winter crop survey. Prior to this, 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 as the previous year's survey were surveyed to ensure accuracy when comparing results between years; this practice should remain consistent for future summer crop surveys. The surveyed area is shown in Figure 1, divided into five different areas in order to compare data between locations. These areas are:

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

Crop Survey Area

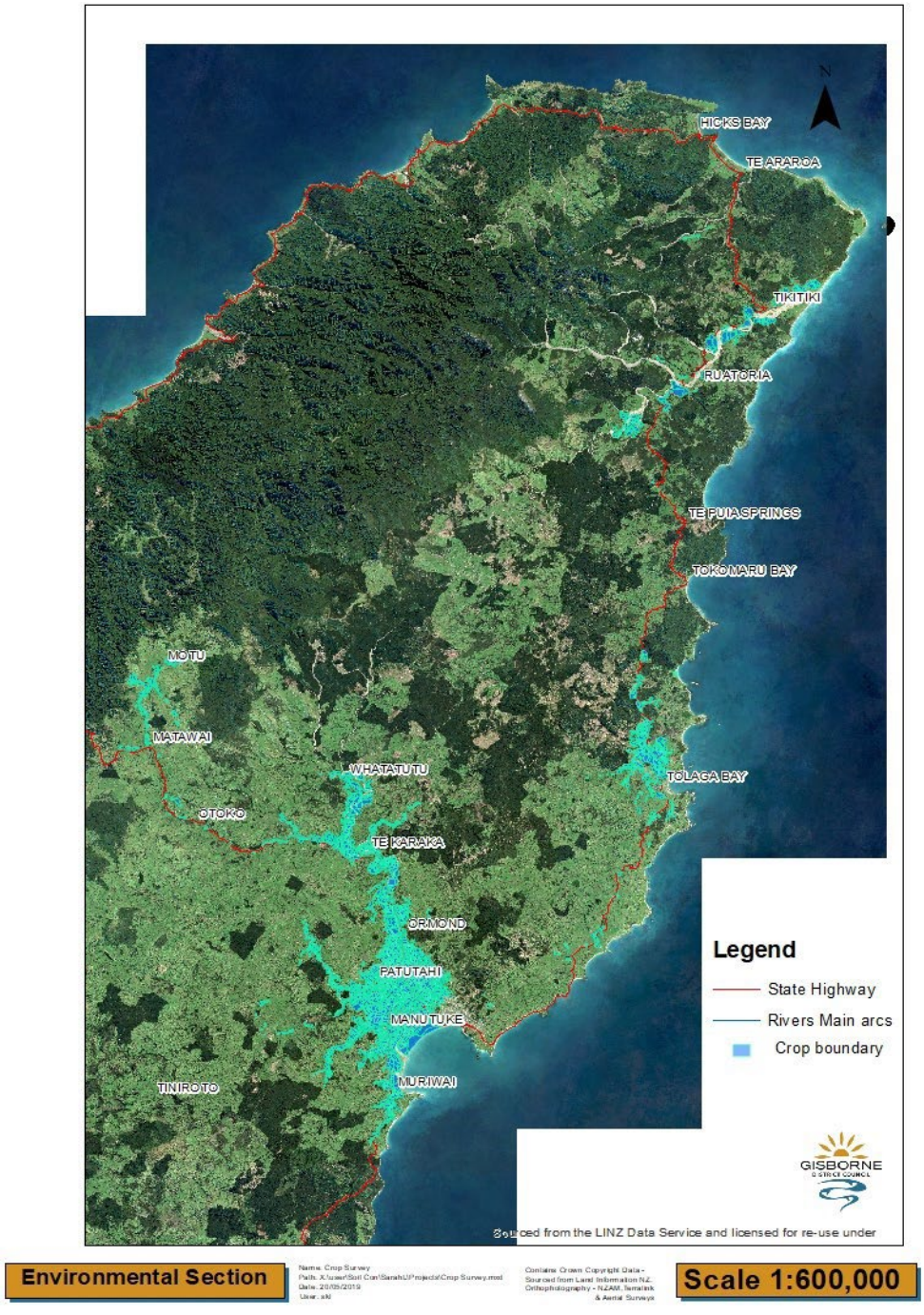

Figure 1. Aerial imagery (2017) showing average extent of area surveyed in the summer crop survey.

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 Table 1.

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'. Crops that were difficult to identify due to them being a hybrid/unidentifiable species were recorded as 'other/unknown', see Table 1. Crops which did not have their own category, such as cherimoya, were placed under 'other/unknown' and in the comments the name of the crop was written. Crops that could not be seen with the binoculars were identified as 'not-visible'. Crops that were not recorded in the 2021/22 Summer Crop Survey were recorded as a new area. 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. Previously cropped areas now converted into properties/industrial buildings have been removed from the 2022/23 crop survey.

Table 1. Crop types surveyed in the Gisborne region

Crop types surveyed	
Apples and pears	Olives
Avocados	Other/unknown
Baleage	Pasture/unused
Cauliflower/broccoli	Persimmon
Chicory	Pine nursery
Citrus	Pinenuts
Clover	Plantain
Courgettes	Plantain/chicory
Feijoa	Plantain/clover
Flowers	Pomegranate
Forage Rape	Poplar/willow nursery
Grapes	Squash
Kiwifruit	Stonefruit
Leafy turnip	Strawberries
Lettuce/cabbage	Swedes
Lucerne	Tamarillo
Lupin	To-be-planted/tilled
Maize/sweetcorn	Tomatoes
Melons	Yarrow
Not-visible	
Oats	

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 drawn when discussing any changes or trends in crop types throughout the region. Appendix 1 contains all the data from the 2022/23 Summer Crop Survey.

This year (2022/23) the Gisborne regions area of summer crops excluding pasture/unused land, not-visible and to-be planted/tilled land was 13,252.5 hectares. The total area surveyed including pasture/unused land (9065.0 ha), not-visible (1618.9 ha), and to-be planted/tilled land (417.7 ha) was 24,354.1 hectares.

It is important to recognise the overall area of our regions summer crops excluding these variables as this is the area most likely to have negative impacts on the soil and nearby waterways. Commercial crops are often subject to irrigation, fertilisers and/or pesticides of which can impact the soil and waterways within a close proximity.

Pasture/unused land is less likely to experience irrigation, fertilisers and/or pesticides compared to commercial crops. Land which was not-visible was excluded as the potential impacts on soil and/or waterways cannot be determined. To be planted/tilled land can pose some short-term risks such as bare soil eroding into waterways, and seeds/seedlings being intensively irrigated, and/or fertilized. However, these crops and their potential future impacts are currently unknown and therefore are excluded.

The 2022/23 survey had a reduced total area of summer crops (13,252.5 ha) compared to the previous two years, the 2021/22 survey (13,360.5 ha) and the 2020/21 survey of summer crops (15,432.6 ha). This reduction may be explained by some cropped land being converted into properties/industrial buildings, no access to private properties restricting visibility of crops, and heavy rain during this summer period reducing visibility of crops in some cases. This could explain the reduction in total area of summer crops as converted land would be excluded from the survey and areas defined as 'not-visible' are not included in the area of summer crops statistic.

The total area in hectares (ha) of each crop type surveyed in the Gisborne region can be seen in Table 2 and summer crops (excluding pasture, not visible and to be planted/tilled land) can be seen in figure 2.

Table 2. Total area in hectares (ha) of each crop type identified in the 2022/23 summer crop survey

Crop	Area (ha)	Crop	Area (ha)
Apples and pears	603.7	Oats	5.4
Avocados	78.8	Olives	7.7
Baleage	212.5	Other/unknown	175.0
Cauliflower	18.3	Pasture/unused	9065.0
Chicory	671.0	Persimmons	91.5
Citrus	1549.9	Pine nursery	47.5
Clover	176.4	Pinenuts	1.5
Courgettes	31.0	Plantain	104.9
Feijoa	45.3	Plantain/chicory	64.8
Flowers	1.7	Plantain/clover	39.0
Forage Rape	41.7	Pomegranate	1.7
Grapes	1584.3	Poplar/willow nursery	11.4
Kiwifruit	798.6	Squash	370.3

Leafy Turnip	123.0	Stonefruit	20.1
Lettuce/cabbage	56.7	Strawberries	0.2
Lucerne	360.6	Swede	1.4
Lupin	1.8	Tamarillo	6.0
Maize/sweetcorn	5785.5	To-be-planted/tilled	417.7
Melons	17.7	Tomatoes	120.6
Not-visible	1618.9	Yarrow	59.1
		Total area	**24354.1**

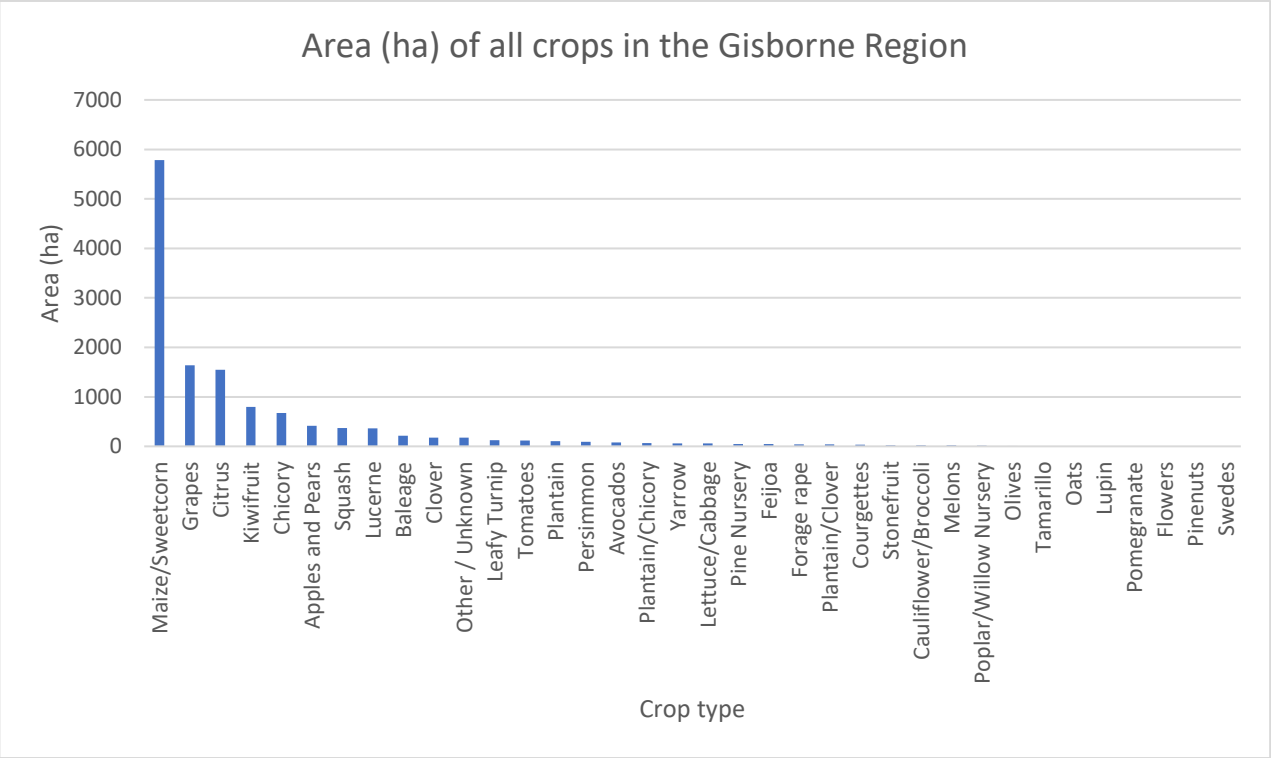

Figure 2. Total area (ha) of crop types identified in the 2022/23 Summer Crop Survey

3.1 Major Crop Types

The results section shows observations and trends of major crop types. The major crop types were determined by the total area in hectares that they covered. Major crops from this year's summer crop survey (2022/23) can be seen in Table 3. The seven major crop types (highlighted in green) were analysed to test if there were any long-term trends over the eight summers of sampling, these trends can be seen in Figure 3. Pasture/unused, not-visible and to-be-planted/tilled land have not been highlighted as they were excluded in the summer crop total for reasons stated in section 3.0 Results above.

Table 3. Major crop types in the Gisborne region (2022/23)

Crop type	Hectares (ha) total
Pasture/unused	9065.0
Maize/sweetcorn	5785.5
Not visible	1618.9
Grapes	1584.2
Citrus	1549.9
Kiwifruit	798.6
Chicory	671.0
Apples and Pears	603.7
To be planted	417.7
Squash	370.3

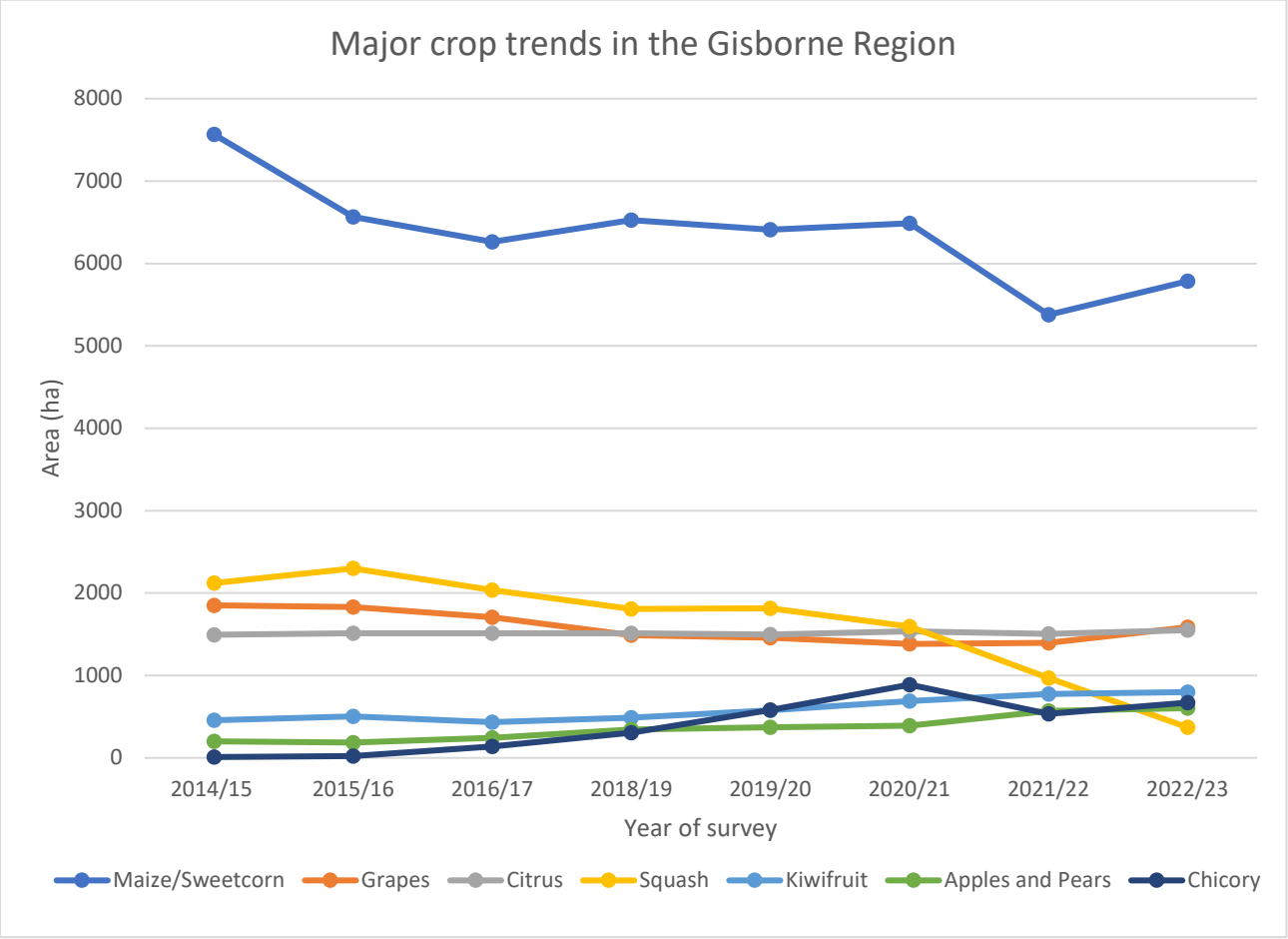

Figure 3. Eight-year trend of major summer crops in the Gisborne region

3.1.1 Maize/Sweetcorn

Maize and sweetcorn were the most abundant crops in the Gisborne region. Maize and sweetcorn account for 43.7% of all crops recorded in the Gisborne region (excluding pasture/unused, not visible and to be planted/tilled land), covering 5785.5 hectares of land. Maize and sweetcorn were grouped together for the purpose of analysis as they were difficult to identify separately in juvenile form and pose very similar impacts on the environment and waterways.

Observations and trends:

Over time there has been a decreasing trend in the area of maize and sweetcorn as seen in figure 4, with a major drop from 2014/15 to 2015/16, then the area of maize and sweetcorn remains reasonably consistent until a second drop in area in 2021/22 of 1,108.7 hectares. The most recent summer crop survey (2022/23) shows an increase in area to 5785.5 hectares, encompassing a rise of 408.7 hectares of maize/sweetcorn in the Gisborne region.

This year's increase suggests a recent transition of land from other crops/pasture to maize and sweetcorn and potentially previously 'to be planted' areas now being used for maize and sweetcorn.

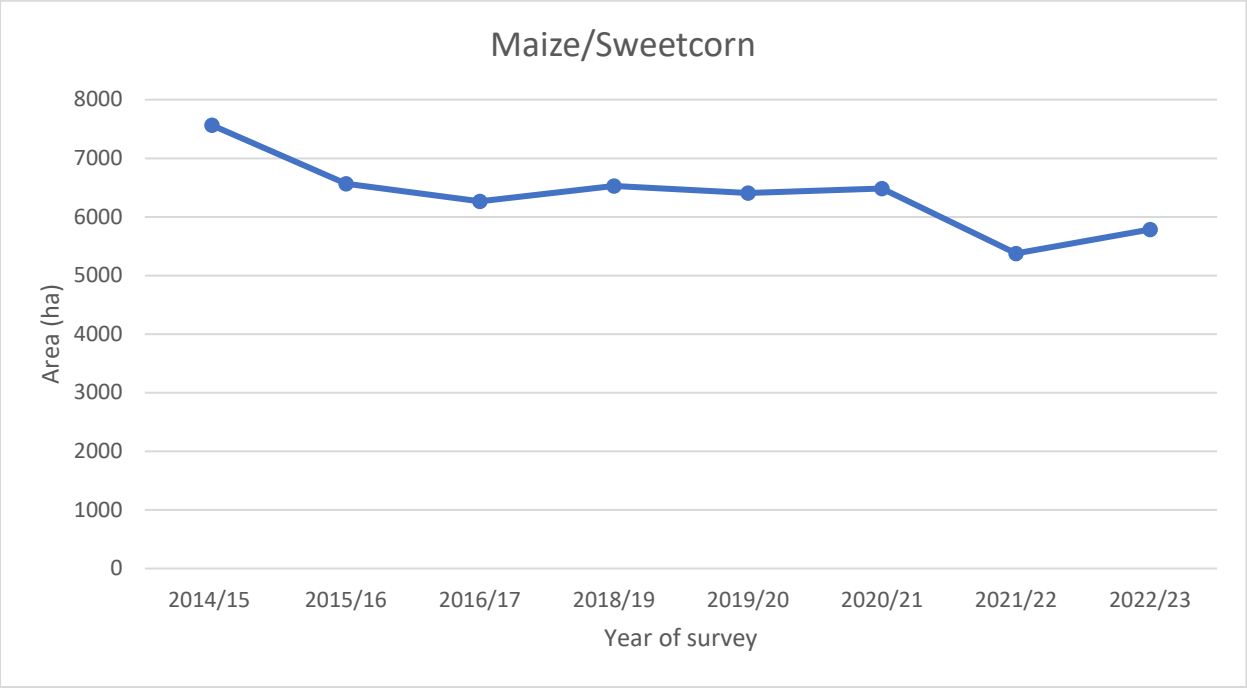

Figure 4. Eight-year trend of the total area in hectares (ha) of maize/sweetcorn in the Gisborne region (2014/15 – 2022/23)

3.1.2 Grapes

Grapes are another common crop identified in the Gisborne region. The area of grapes covered 1584.3 hectares making it the second most abundant summer crop in the region, accounting for 12% of the total summer crops surveyed in the region.

Observations and trends:

Grapes have shown a steady decreasing trend since the survey began in 2014/15 up until last year's survey (2021/22) as seen in figure 5. This year there was an observed increase in area of grapes of 188.2 hectares. This change may be attributed to a large portion of cropped land transitioning to grape vineyards, as suggested by the young vines observed during this year's survey (2022/23).

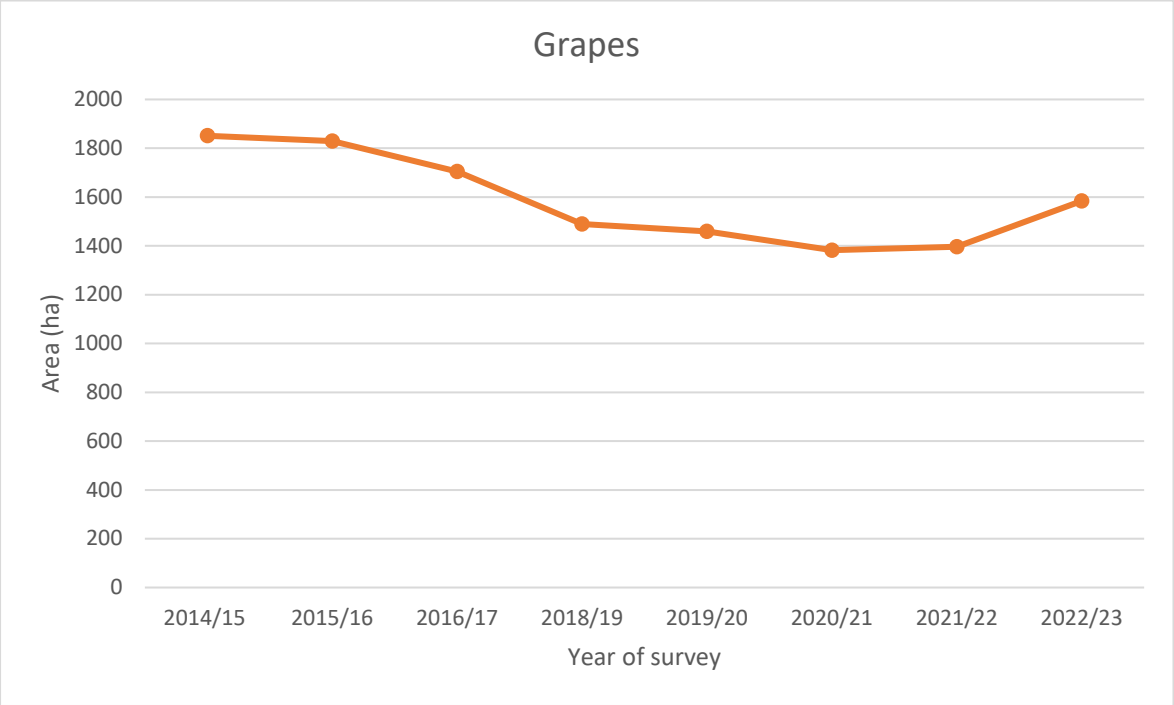

Figure 5. Eight-year trend of the total area in hectares (ha) of grapes in the Gisborne region (2014/15 – 2022/23)

3.1.3 Citrus

The total area of citrus crop for 2022/23 was 1549.9 hectares. The citrus category encompasses oranges, lemons, mandarins, limes and grapefruits. They are grouped together due to their similarity in appearance and management. The citrus crop contributes to 11.7% of the total summer crops recorded in the region (excluding pasture/unused, not visible and to be planted/tilled land).

Observations and trends:

The citrus crop has shown multiple changes over time as seen in figure 6. Between 2014/15 and 2019/20 the citrus crop area remained reasonably consistent between 1494.34 and 1513.93 hectares. Fluctuations began in 2019/20 where area increased by 38.92 hectares into 2020/21, following this there was a decrease of 30.58 hectares recorded in 2021/22, and this year (2022/23) the area increased to its highest value so far of 1549.9 hectares. This recent increase may be attributed to the new citrus areas found throughout the region in places that have not previously been recorded. Additionally, it may be due to the conversion of pasture/crops into citrus as suggested by the newly planted citrus trees observed during this year's survey.

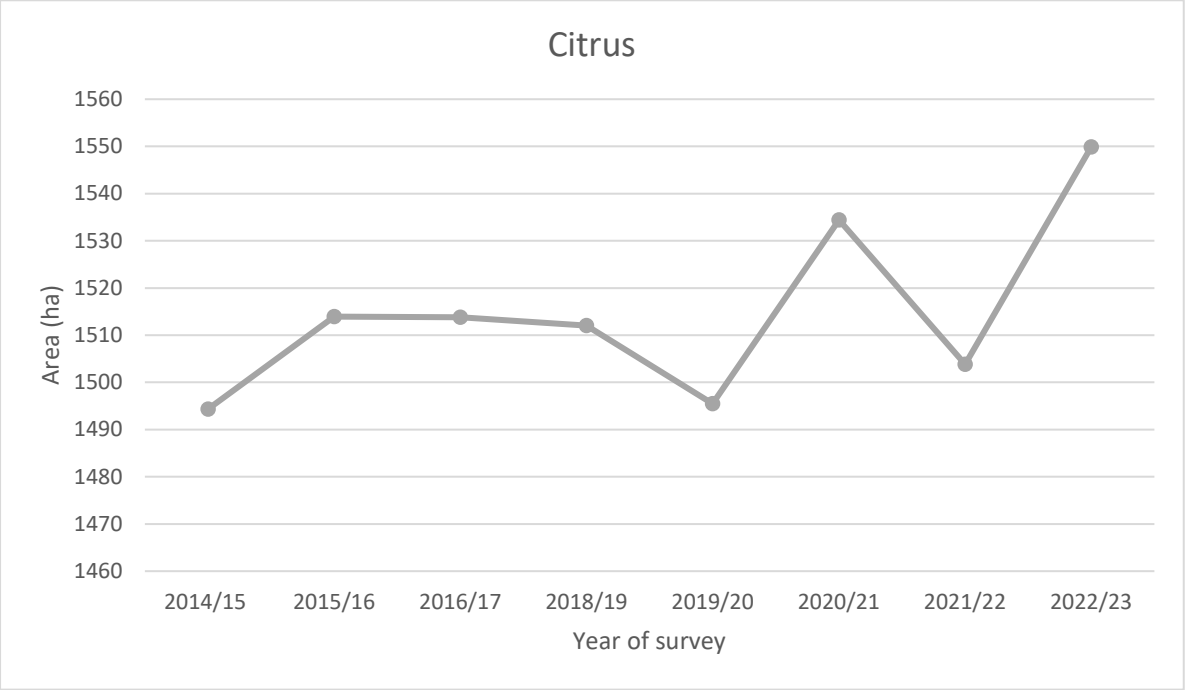

Figure 6. Eight-year trend of the total area in hectares (ha) of Citrus in the Gisborne region (2014/15 – 2022/23)

3.1.4 Kiwifruit

The area of Kiwifruit recorded in this summers (2022/23) crop survey was 798.6 hectares. It was the fourth most abundant crop in the region, contributing to 6% of the summer crops recorded (excluding pasture, not-visible and to-be-planted/tilled land).

Observations and trends:

The area of kiwifruit has been compared to the previous summer crop surveys as seen in Figure 7. There has been an observed rise in the area of kiwifruit in the region since the 2016/17 crop survey. The previous crop survey (2021/22) noted installation of kiwifruit infrastructure and as the kiwifruit had not been planted yet it was not recorded in the total area, thereby suggesting a continued increasing trend in future surveys. The increasing trend continued as expected in this year's survey (2022/23) with the area of kiwifruit in the Gisborne region rising by 23.4 hectares. Once again kiwifruit infrastructure was observed during the survey suggesting this trend will continue.

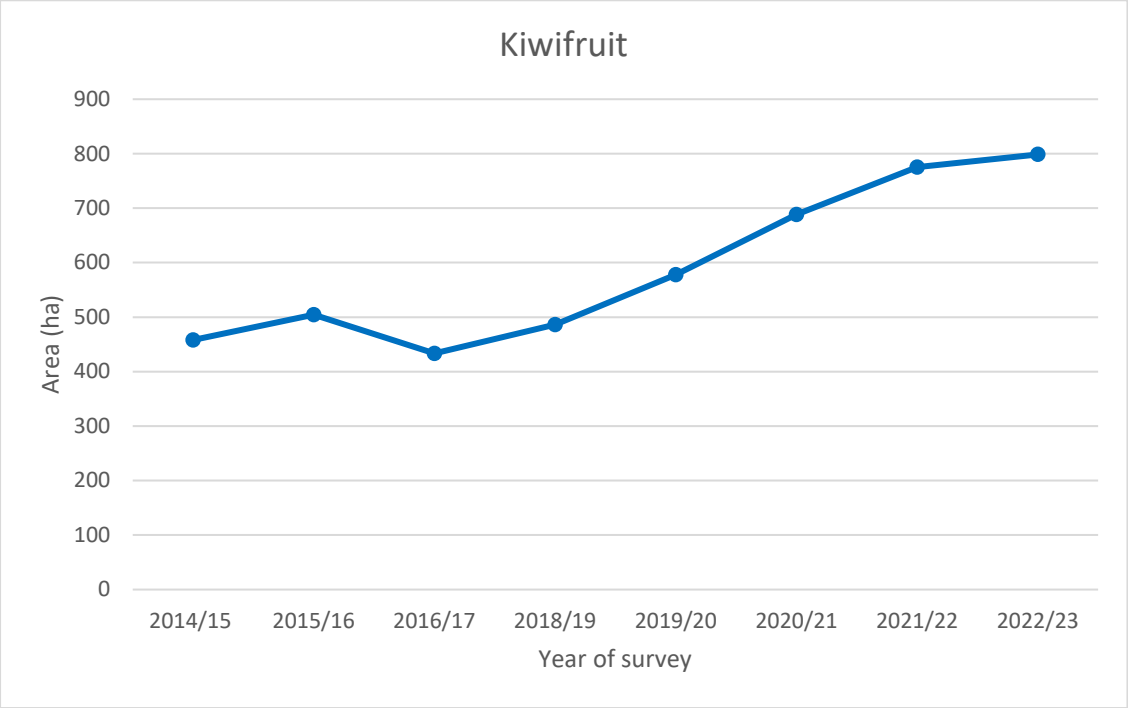

Figure 7. Eight-year trend of the total area in hectares (ha) of kiwifruit in the Gisborne region (2014/15 – 2022/23)

3.1.5 Chicory

Chicory is the fifth most abundant crop in the Gisborne region, contributing to 5.1% of summer crops recorded (excluding pasture, not-visible and to-be-planted/tilled land).

Observations and trends:

The area of chicory has shown an increasing trend from 2014/15 up until last year (2021/22) when a major drop in the cropped area of chicory occurred, as seen in figure 8. In 2021/22 the cropped area of chicory decreased by 137.1 hectares, displaying the first decline since the surveys began in 2014/15. This year (2022/23) the area of chicory once again increased, reaching 671 hectares.

Chicory is a common summer crop in the region as it provides a high feed value, aiding in the growth of stock. The recent increase may be attributed to an increase in demand for chicory or/and due to other cropped land being converted to chicory.

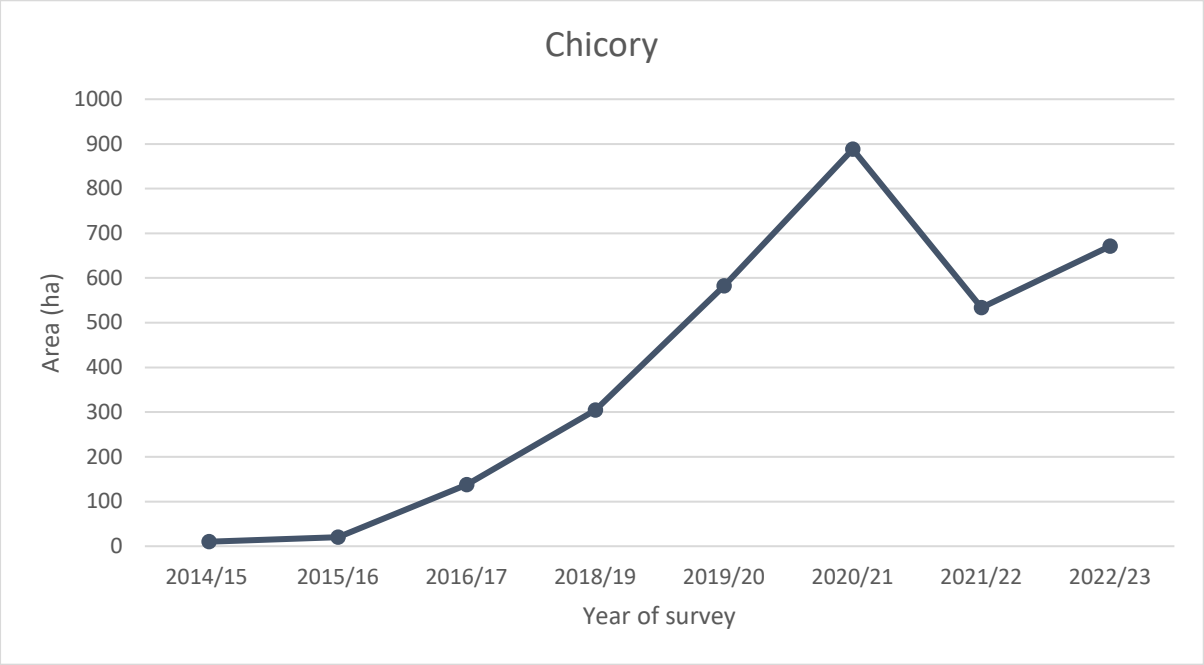

Figure 8. Eight year trend of the total area in hectares (ha) of Chicory in the Gisborne region (2014/15- 2022/23)

3.1.6 Apples and Pears

Apples and pears are another common crop identified in the Gisborne region. The area of apples and pears recorded for 2022/23 was 603.7 hectares. The crop contributed to 4.6% of the summer crops recorded (excluding pasture, not visible and to be planted/tilled land), making it the sixth most abundant crop in the region. Apples and pears have been grouped together due to them having the same infrastructure and a similar appearance as young trees.

Observations and trends:

The area of apples and pears has been compared to previous summer crop surveys and as seen in Figure 9, the crop area of apples and pears has increased annually since the 2015/16 summer crop survey. This trend continued in the most recent summer crop survey (2022/23) with the area increasing to 603.7 hectares. In the past seven years we have seen a large change in the area of apples and pears in the Gisborne region with an increase of 417.6 hectares, and this increasing trend is expected to continue with the observed installation of apple and pear infrastructure during this year's survey (2022/23).

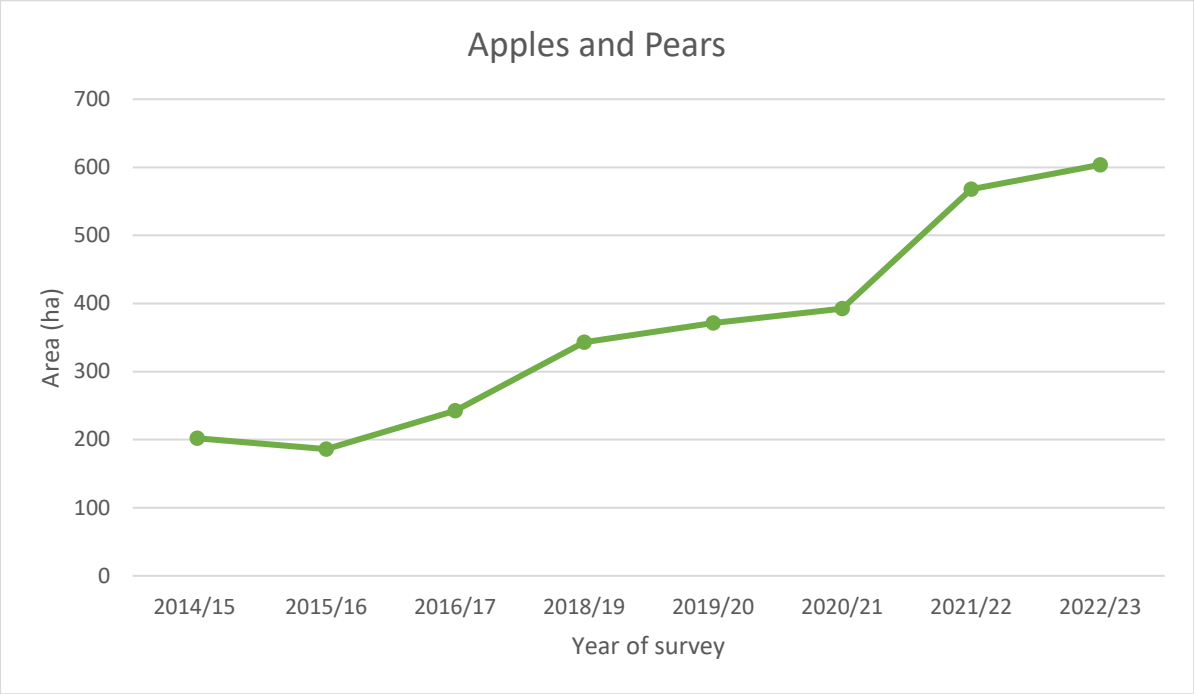

Figure 9. Eight year trend of the total area in hectares (ha) of Apples and Pears in the Gisborne region (2014/15 – 2022/23)

3.1.7 Squash

Squash was the seventh most abundant crop type identified in the Gisborne region, covering an area of 370.3 hectares and accounting for 2.8% of all crops recorded in the Gisborne region (excluding pasture, not visible and to be planted/tilled land). The squash category encompasses butternut squash and pumpkin crops.

Observations and trends:

The area in hectares (ha) of squash crops has been compared to the previous summer crop surveys and trends have been observed as seen in figure 10. The cropped area of squash peaked in 2015/16 at 2,299.2 hectares, it has since been quickly declining, reaching an all-time low this year (2022/23) of 370.3 hectares.

The long-term decreasing trend may be associated to the increase in crops classified as 'not visible' resulting from lack of access to private properties and at times, low visibility due to the poor weather conditions this summer. In addition, it may be attributed to the diversification of what is grown in the region.

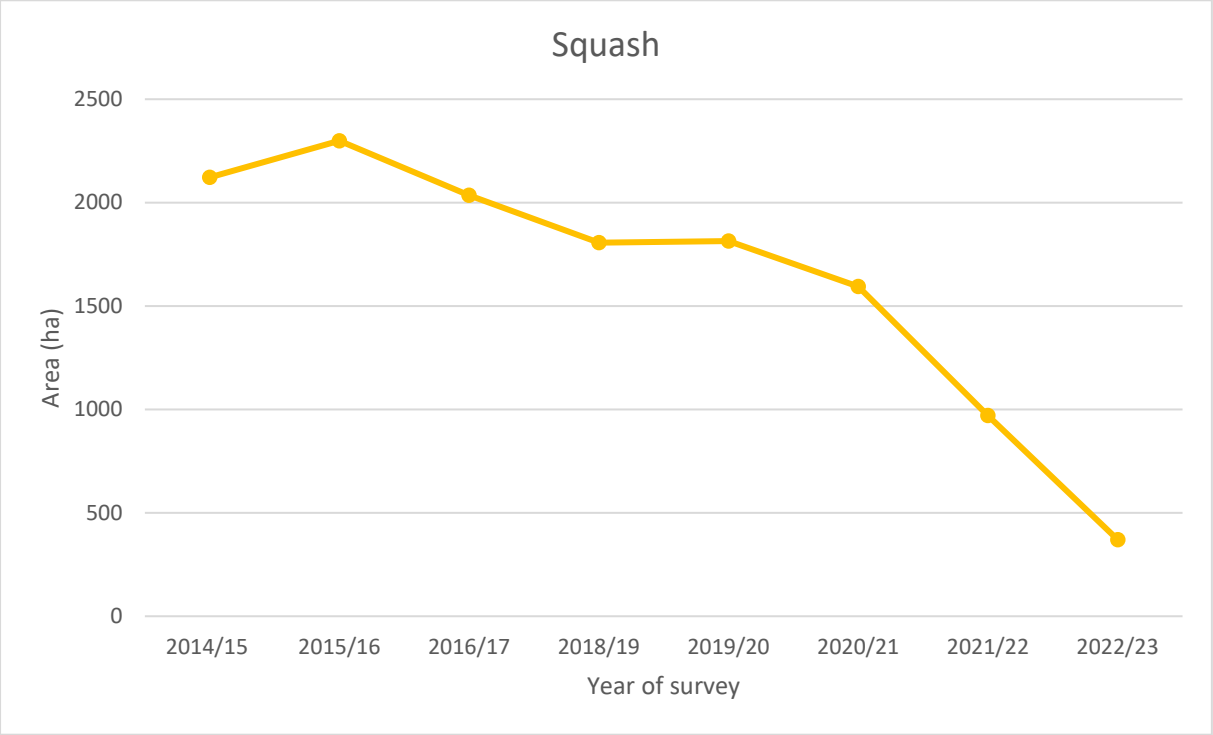

Figure 10: Eight year trend of the total area in hectares (ha) of squash in the Gisborne region (2014/15 – 2022/23)

3.1.8 Not visible

Not visible had a total crop area of 1618.9 hectares. The reason for this high area of not-visible land is likely due to the access restrictions into private properties. This resulted in many crops being out of view due to physical barriers including wind breakers, houses, hills, and distance. In addition, ex-cyclone Hale brought heavy rain to the area whilst part of the survey took place, the heavy rain caused low visibility at times.

3.2 Location

3.2.1 The Poverty Bay Flats

The total surveyed area for the Poverty Bay Flats region was 14,518.5 hectares. The total area of pasture (3719.9 ha), not visible (972.3 ha) and to be planted/tilled land (416.8 ha) was excluded to calculate the total area of summer crops, which was 9,409.5 hectares. This area had the largest variety of crops in the district. The crop types found in this area can be seen in figure 11. Crops with an area % contributing to less than 1% of the total crop area in the Poverty Bay Flats have been grouped together in the 'various' category in figure 11 and expanded in figure 12.

Maize and sweetcorn were the largest contributing crop type in the area, making up 40.4% of the total summer crops in the Poverty Bay flats (2022/23). This surveyed year (2022/23) maize and sweetcorn covered a total area of 3801.4 hectares in the Poverty Bay flats, increasing by 199.4 hectares since last year's survey (2021/22). Citrus was the second most abundant crop in this area covering 1,488.6 hectares, closely followed by grapes at 1,466.1 hectares, both crops have increased in area (ha) within the Poverty Bay flats compared to last year's survey (2021/22). Kiwifruit is the fourth most common crop in the Poverty Bay flats at 773.1 hectares, followed by apples and pears with 549.7 hectares, squash with 257.8 hectares and chicory with 227.1 hectares. The largest change within the Poverty Bay flats cropped land compared to the previous year's survey (2021/22) was the squash crop, decreasing by 295.8 hectares.

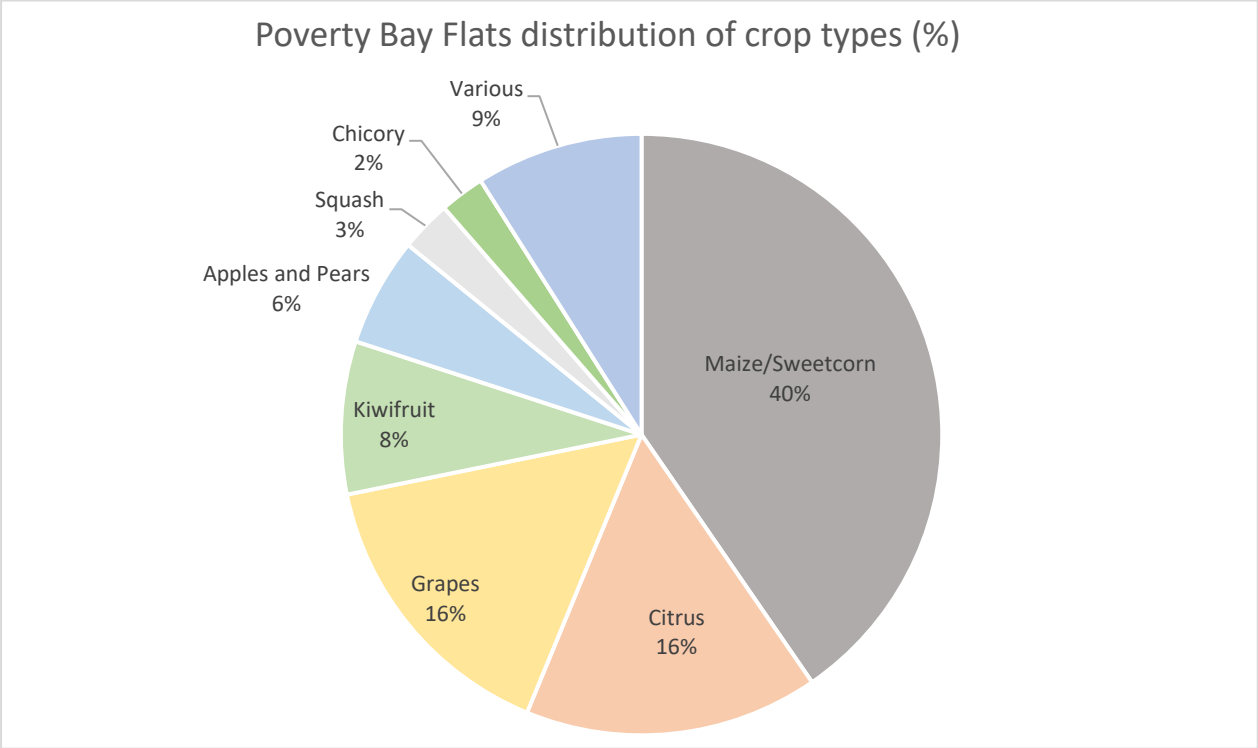

Figure 11. Crop Types recorded on the Poverty Bay Flats in % value by area (ha)

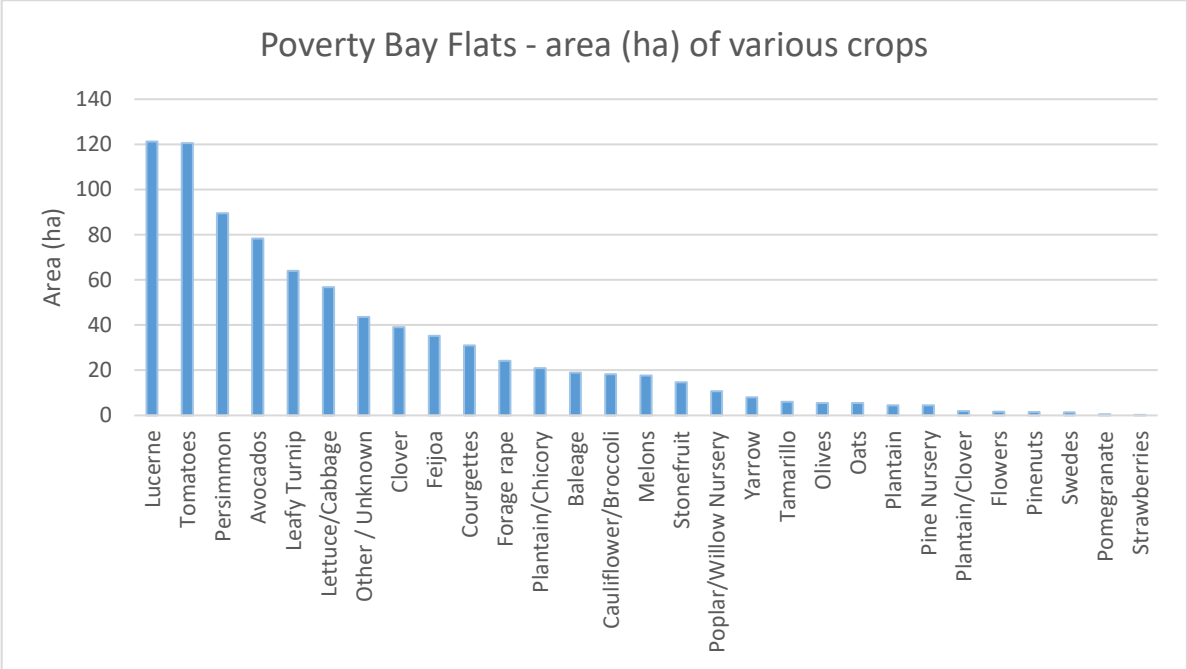

Figure 12. Various crop types in the Poverty Bay Flats breakdown

3.2.2 East Cape/Ruatoria

The total surveyed area for the East Cape/Ruatoria region was 2,657.8 hectares. The area of pasture (2,200 ha), not visible (49.8 ha), and to be planted/ tilled land (0 ha) were excluded to calculate the total area of summer crops, which was 407.9 hectares.

The distribution of crops in the East Cape/Ruatoria area can be seen in figure 13. The most common crop in the area was lucerne with 119.8 hectares, closely followed by chicory with 114.8 hectares, both crops have decreased in area (ha) compared to the previous years survey (2021/22). The third most abundant crop in the area was balaege with 56.8 hectares, followed by plantain with 30.7 hectares. The remaining crops including plantain/clover, clover, citrus, yarrow, olives, forage rape, poplar/willow nursery, and other/unknown were found at much lower quantities.

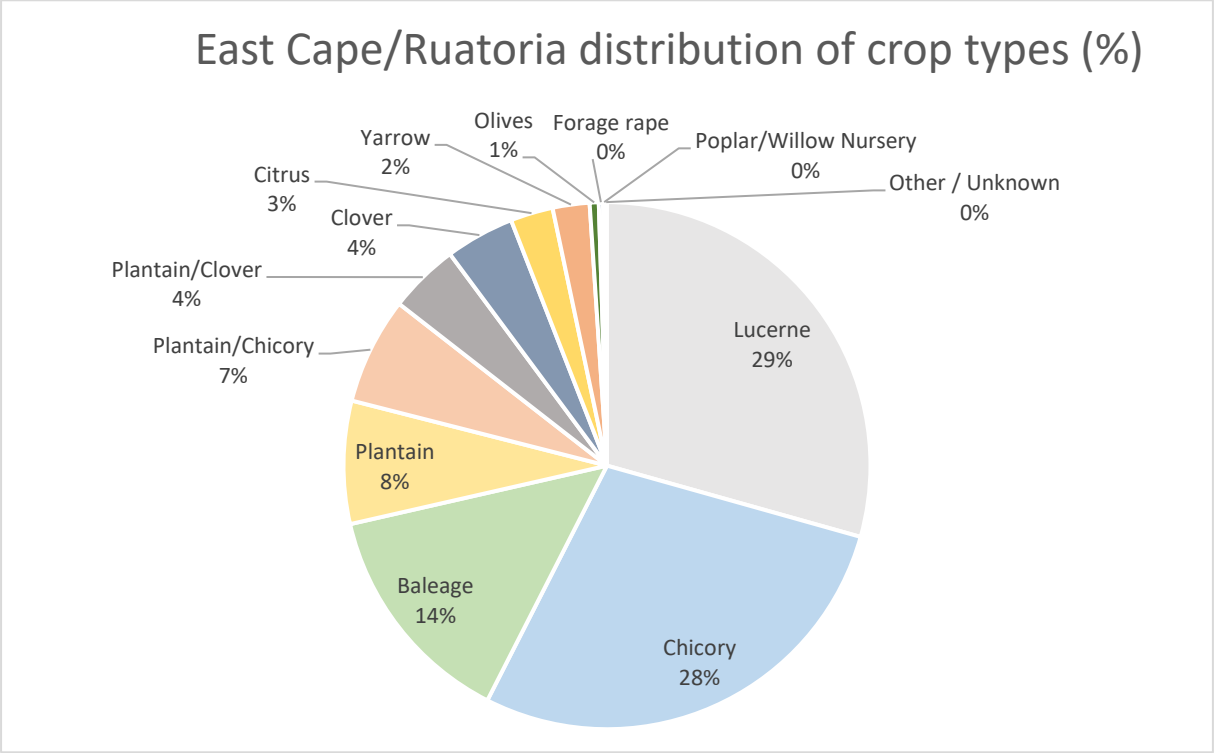

Figure 13. Crop Types recorded in the East Cape/ Ruatoria area in % value by area (ha).

3.2.3 East/Tolaga/Tokomaru

The total area surveyed for the East/Tolaga/Tokomaru area was 3,037.5 hectares. The area of pasture (1,255 ha), not visible (44.4 ha), and to be planted/tilled land (0 ha) was excluded to calculate the total area of summer crops, which was 1,738.1 hectares. The distribution of crop types can be seen in figure 14.

The most common crop found in this region was maize/sweetcorn contributing to 59% of the total summer crops in East/Tolaga/Tokomaru, with a total area of 1,029.4 hectares. Chicory was the second most abundant crop with 159.4 hectares followed by other/unknown with 129.7 hectares, clover with 116.8 hectares, plantain with 69.6 hectares, lucerne with 66.4 hectares, yarrow with 41.8 hectares, citrus with 35.8 hectares, leafy turnip with 33.8 hectares, and baleage with 28.6 hectares. “Various crops” are crops that contributed to less than 1% of the total summer crops in the East/Tolaga/Tokomaru area, they have been grouped together in figure 14 and expanded in figure 15.

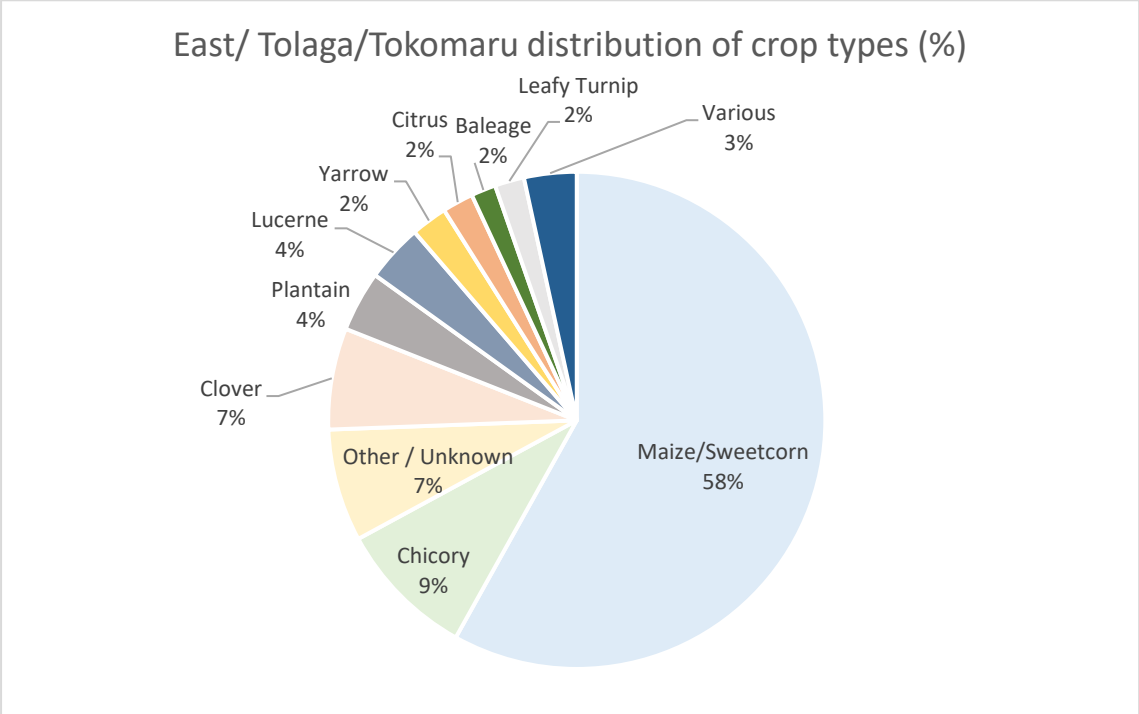

Figure 14. Crop Types recorded in the East/Tolaga/Tokomaru area in % value by area (ha).

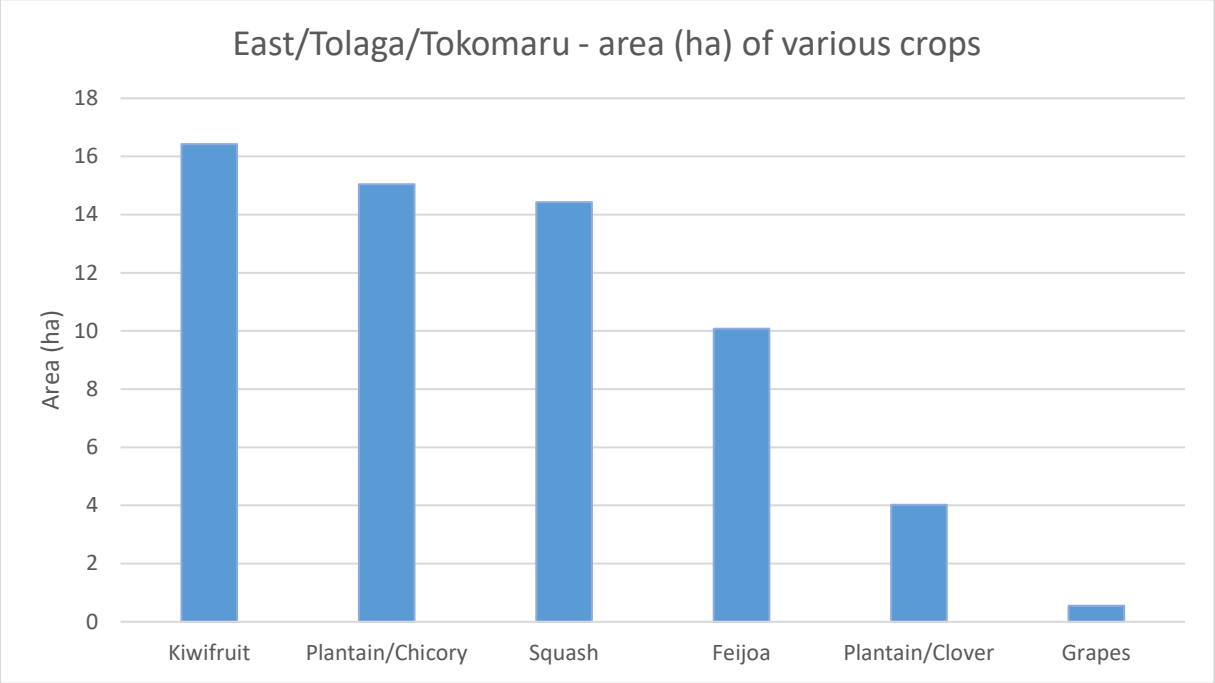

Figure 15. Various crop types in the East/Tolaga/Tokomaru breakdown.

3.2.4 Mōtū/Mātāwai

The total area surveyed for the Mōtū/Mātāwai area was 835.2 hectares. The area of pasture (616.8 ha), not visible (96.0 ha) and to be planted/tilled land (0.9 ha) was excluded to calculate the total area of summer crops which was 121.4 hectares. The total area (ha) of each crop by % value can be seen in figure 16. The most abundant crop in the area was balaege with 87.9 hectares, covering 72% of the areas cropped land. Other crops found in the region were leafy turnip with 23.7 hectares, and forage rape with 9.8 hectares.

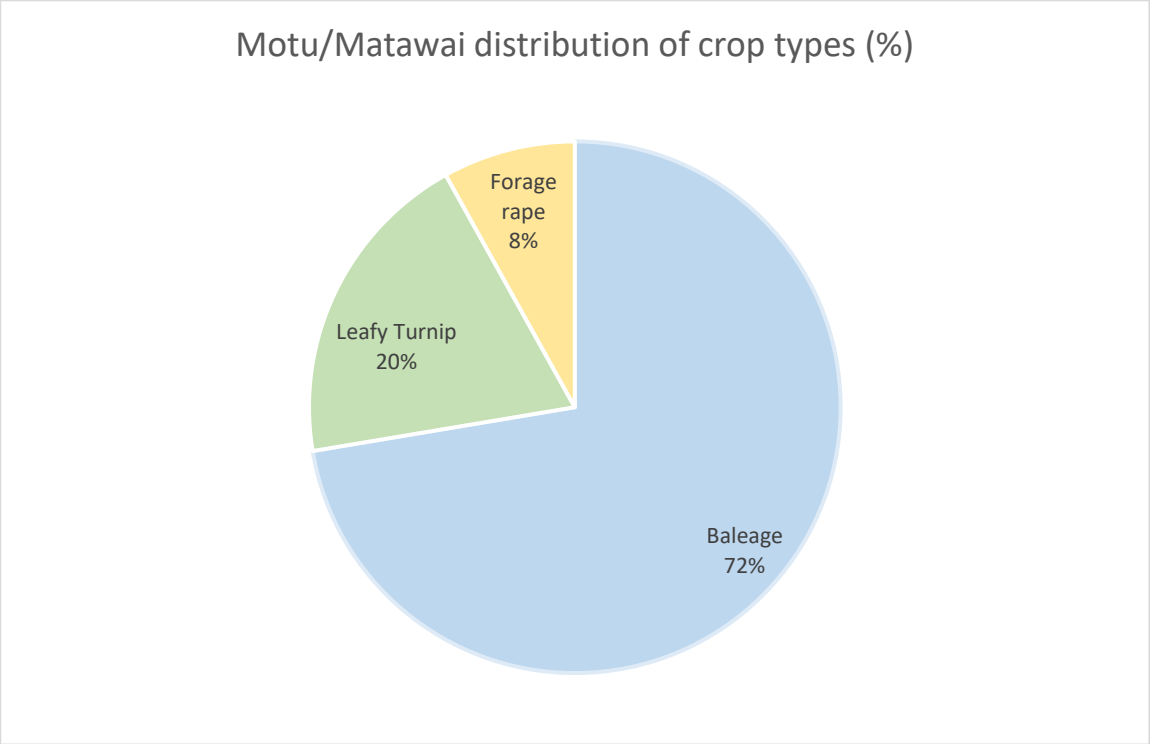

Figure 16: Crop types recorded in Mōtū/Mātāwai area in % value by area (ha).

3.2.5 Te Karaka/Whatatutu

The total area surveyed for the Te Karaka/Whatatutu area was 3,305.1 hectares. The area of pasture (1,273.3 ha), not-visible (456.2 ha), and to be planted land (0 ha) were excluded to calculate the total area of summer crops, which was 1,575.6 hectares. The total area of each crop by % value can be seen in figure 17. Crop types that make up less than 1% of the cropped area have been grouped together in the "various" category in figure 17, and expanded in figure 18.

The most abundant crop in the area was maize/sweetcorn with 954.6 hectares, up by 242 hectares compared to last years survey (2021/22). The second most common crop in the area was chicory which also experienced a major increase since last year's survey, increasing from 49.2 hectares to 169.7 hectares. Grapes made up 117.6 hectares, followed by squash with 98 hectares experiencing a decrease of 166.3 hectares compared to last years survey. Apples and pears made up 54 hectares, lucerne made up 53.2 hectares, pine nursery made up 43.1 hectares, "various" crops made up 25.6 hectares, balaege made up 20.3 hectares, plantain/clover made up 15.4 hectares, citrus made up 14.8 hectares, and kiwifruit made up 9.1 hectares.

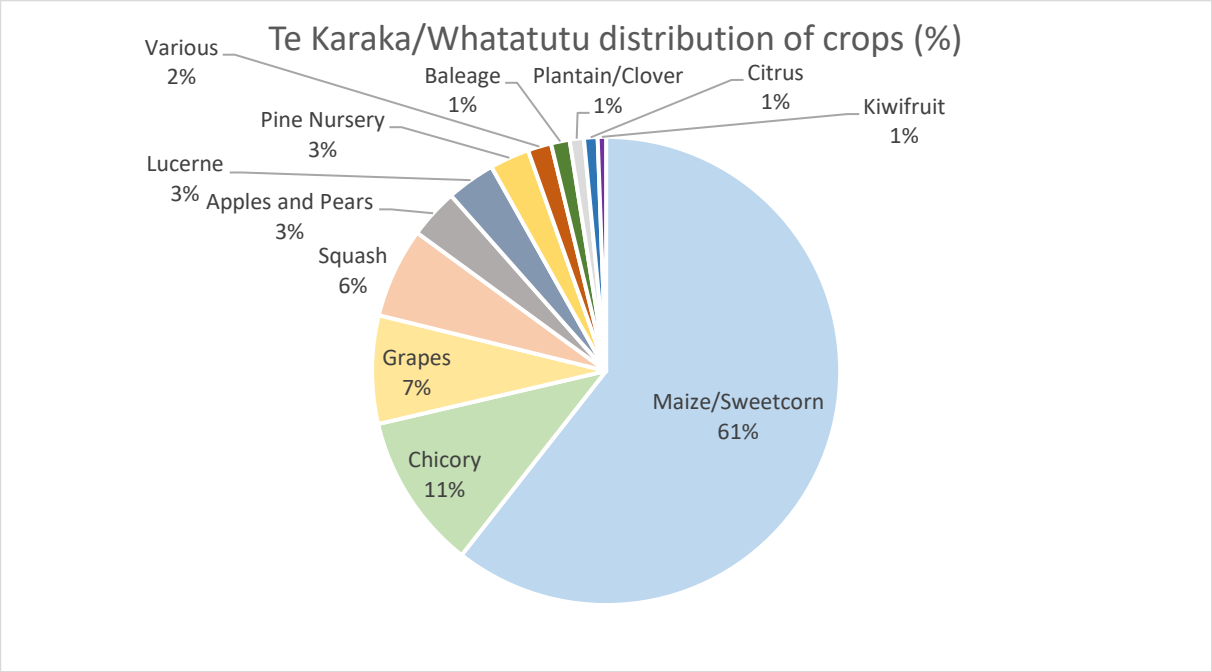

Figure 17: Crop types recorded in Te Karaka/Whatatutu area in % value by area (ha)

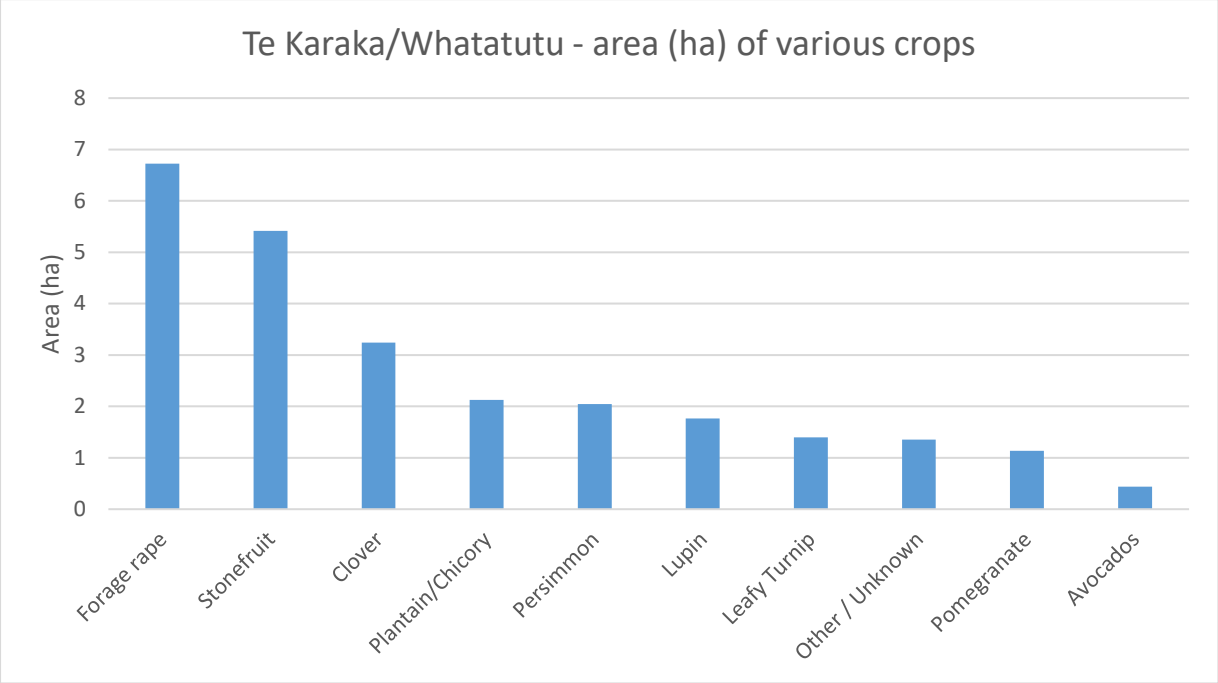

Figure 18. Various crop types in Te Karaka/Whatatutu breakdown.

3.3 Taruheru Catchment

The Taruheru Catchment covers the area between Waihirere and Gisborne city, from the surrounding hills to the Waipaoa River. The Taruheru River runs from the Waihirere Stream to the Turanganui River and is surrounded by fertile land and thus has been intensively cropped for many years. State of the Environment monitoring has found that nitrate, ammonia, phosphorus and e.coli levels are all above national bands and do not meet the freshwater objectives set in the Tairāwhiti Resource Management Plan. The Gisborne District Council State of the Environment Report 2022 states that the high nutrient levels in the Taruheru River are primarily related to the intensive horticultural lands. This section covers the long-term trends in commercial cropping in the Taruheru Catchment.

Data from the summer crop surveys from 2008 to 2023 (excluding 2013-2015 as summer crop surveys were not conducted in these years) has been compiled to help identify trends in land use in the Taruheru Catchment. The full table of the data can be found in Appendix 2 of this report and is summarised below in Figure 19.

Trends show that from the first survey in 2007/08 to the most recent survey in 2022/23 the area of cropped land in the Taruheru catchment (excluding pasture, not visible, and to be planted/tilled land) has increased by 1,020.5 hectares, from 2,624.5 hectares (2007/08) to 3,645 hectares (2022/23). This year there has been a major increase from 2,624.4 hectares in 2021/22 to 3,645 hectares in 2022/23. This may be attributed to the conversion of pasture/unused land to cropped land in the Taruheru catchment, suspected due to the decrease in pasture/unused land in this years survey compared to last years survey (2021/22).

Maize and sweetcorn remain the most abundant crop with an area of 693.7 hectares. Citrus is the second most abundant crop with 546.7 hectares, followed by Grapes with 470.5 hectares, kiwifruit with 336.1 hectares, apples and pears with 155.5 hectares, squash with 81.6 hectares, lettuce and cabbage with 56.7 hectares, persimmon with 53.9 hectares, leafy turnip with 39 hectares, and tomatoes with 13.2 hectares.

Grapes have shown the largest increase in area since last year (2021/22), increasing by 48 hectares, followed by maize and sweetcorn increasing by 27.9 hectares. Leafy turnip, apples and pears, and lettuce and cabbage also experienced increases since last year. Tomatoes have shown the largest decrease in area since last year, decreasing by 29.7 hectares, followed by squash which decreased by 22.9 hectares. Persimmon, citrus, and kiwifruit have also decreased since last year.

Since the first survey in 2007/08 there have been some major changes in crop area. Kiwifruit showed the largest increase, increasing from 136.7 hectares in 2007/08, to 336.1 hectares in 2022/23, resulting in a total change of 199.4 hectares. Tomatoes have shown the largest decrease, decreasing from 257.1 hectares in 2007/08 to 13.2 in 2022/23, displaying a total change of 243.9 hectares. Squash has shown many fluctuations over the years, with its highest value being recorded in 2011/12 with 440 hectares, this year's survey shows it is at an all-time low of 81.6 hectares

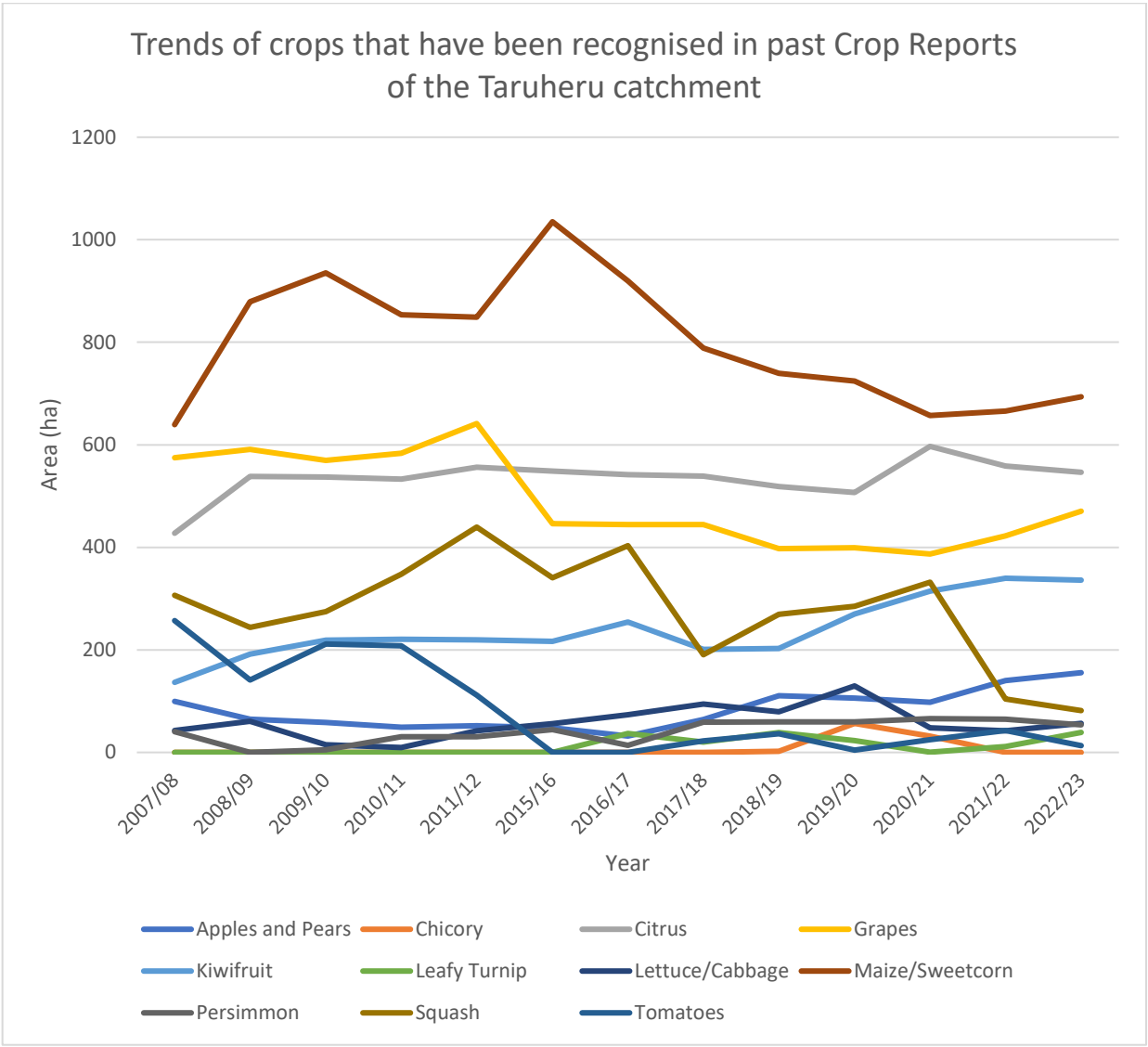

Figure 19. Long Term Crop Trends in the Taruheru Catchment, summer periods from 2007/08 to 2022/23

4.0 Water Threats

Crops were identified as having a threat to water if they triggered any of the relevant rules for cropping in the Freshwater Chapter (section 6) of the TRMP. The water threat relates to rules 6.2.9(2), 6.2.9(3), and 6.2.9(4) of the TRMP, see Appendix 3. Crops that were listed with no water threat did not trigger any of the rules of the TRMP. Cropped areas where the water ways were not visible, the "not-visible" category was used.

Paddock drains were considered a water threat in this survey as they come under the category of being a modified watercourse in the TRMP definitions, see Appendix 4. Modified watercourses will be influenced by the setback requirements under rule 6.2.9 (3) which came into place on the 1st of May 2021, where no cultivation is to be undertaken within 5 metres of the edge of any modified watercourse, permanent or intermittent stream. Crops are only exempt from these rules if they have a farm environment plan demonstrating that a smaller setback of at least 1 meter can occur without adversely impacting on the quality of the receiving waterbody.

The total area that was classed as having a water threat was 4,530.8 hectares. Comprising 19.2% of the total area surveyed in the Gisborne region, and 43.3% of cropped area relevant to having a water threat (not including pasture and permanent crops). Each of the categories and the percentage value of land (ha) identified within each category is shown in figure 20. The categories included; cultivation <5m of a roadside drain, cultivation <5m of the edge of a modified water course or stream, cultivation <10m significant waterway, cultivation <5m of a significant water way, and not visible. Cropped land that did comply with regulations were noted in the abide by rules category. These categories excluding not visible and abide by rules, are included in a separate graph showing the area of land (ha) identified in each category, as seen in figure 21.

Permanent crops e.g. grapes, kiwifruit, citrus, apples and pears, were excluded from the relevant rules as soil loss is minimal and therefore they do not pose a significant threat to water. Pasture/unused land was also excluded as it is difficult to determine when cultivation may have taken place. All other crops were seen as a water threat. If cropping did not comply with the rules it was noted in the survey what rule was not being followed based on the relevant cropping in the freshwater chapter C6 of the TRMP.

The 2022/23 summer crop survey showed the most common water threat was cultivation <5m of a roadside drain, with 2,784.6 hectares of land identified within the category. This was followed by cultivation <5m of the edge of a modified water course or stream with 1,211.7 hectares, cultivation <10m of a significant waterway with 421.5 hectares, and cultivation <5m of a significant waterway with 113 hectares.

It is important to note an amendment to last year's survey (2021/22) in regard to the incorrect interpretation of rule 6.2.9 (4) in the freshwater chapter C6 of the TRMP. This rule, specifically section b, refers to dairy farming and intensively farmed stock activities and is thereby irrelevant to cropping. As a result of the misinterpretation in last year's survey all crops identified to be within 10 meters of a significant water way were recorded as breaching the TRMP rules. This amendment means that the category 'cultivation <10m of a significant waterway' is now only applied to stock feed crops in relation to significant waterways identified in schedule G17 or G18 of the TRMP, which comes under rule 6.2.9 (2). Other crops in regard to significant waterways cannot be cultivated within 5 meters under the TRMP. This error means that comparisons between surveys in relation to water threats to significant waterways cannot be made.

In addition, there is potential for misinterpretation of rule 6.2.9 (3) due to the unrefined definition of an *intermittent stream*. The category that suggests cultivation within 5 meters of a roadside drain is in breach of the TRMP rules by assuming all roadside drains will come under the definition of an

intermittent stream. In order for a roadside drain to come under the *intermittent stream* definition outlined in the TRMP Part E: Definitions, it must have:

- a defined water channel and banks; and
- connects with a permanently flowing surface water body; and
- provides habitat for aquatic flora and/or fauna species

Therefore, there is a strong likelihood that many of the roadside drains noted within the current, and previously conducted surveys, as breaching this restriction may, in fact, be in compliance of this regulation. Moving forward greater understanding and clarification of these rules and restrictions will be needed to create more accurate data in surveys undertaken in the future. However, given the impact that potential contaminants can have on the health of freshwater systems whilst still in accordance with the rules and regulations of the TRMP, the data collected still provides value.

Rule 6.2.9 (3) and rule 6.2.9 (4) in chapter C6 of the TRMP states "no cultivation is undertaken within 5 meters of the edge of any modified watercourse, permanent or intermittent stream". This year (2022/23) the rule was triggered by 1,211.7 hectares of land, showing an increase of 96.9 hectares compared to last years survey (2021/22). The area (ha) of land identified in the category of cultivation <5m of a roadside drain has increased from 2,445.6 hectares in 2021/22 to 2,784.6 hectares this year in 2022/23.

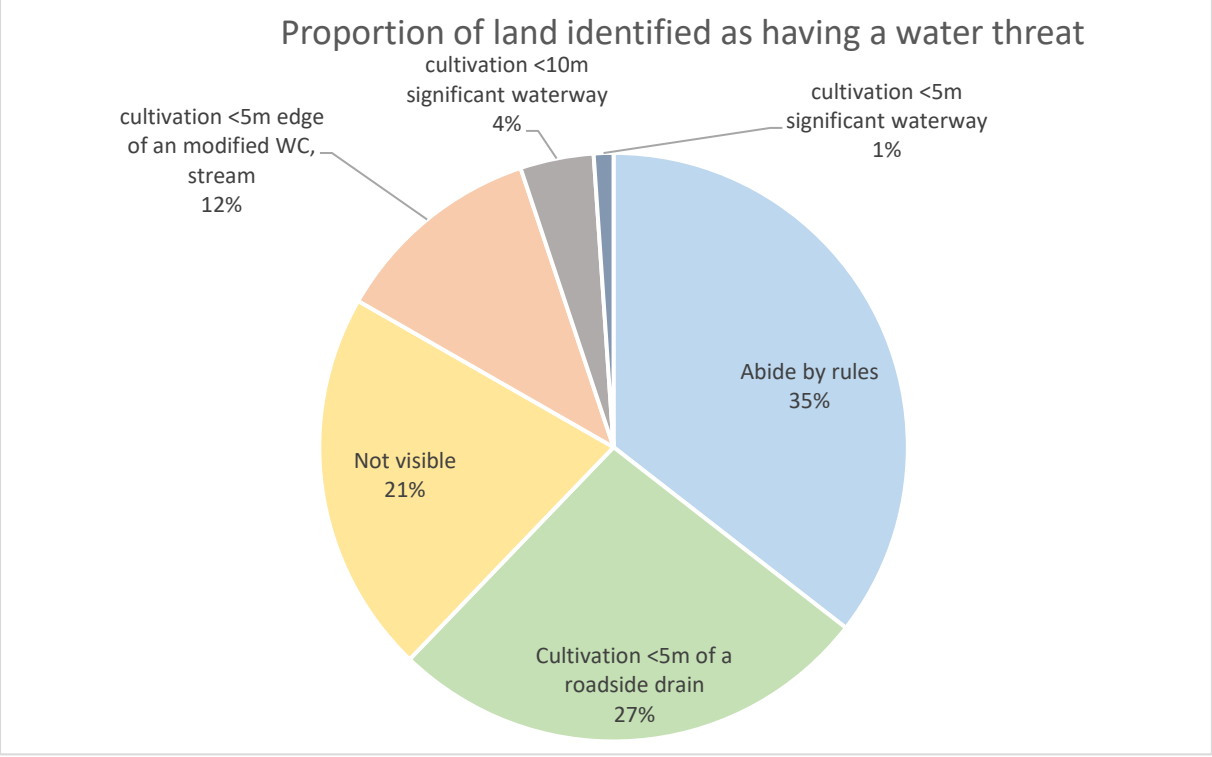

Figure 20. Proportion of land (ha) in the Gisborne region triggering rules in the freshwater chapter of the TRMP and identified as a water threat.

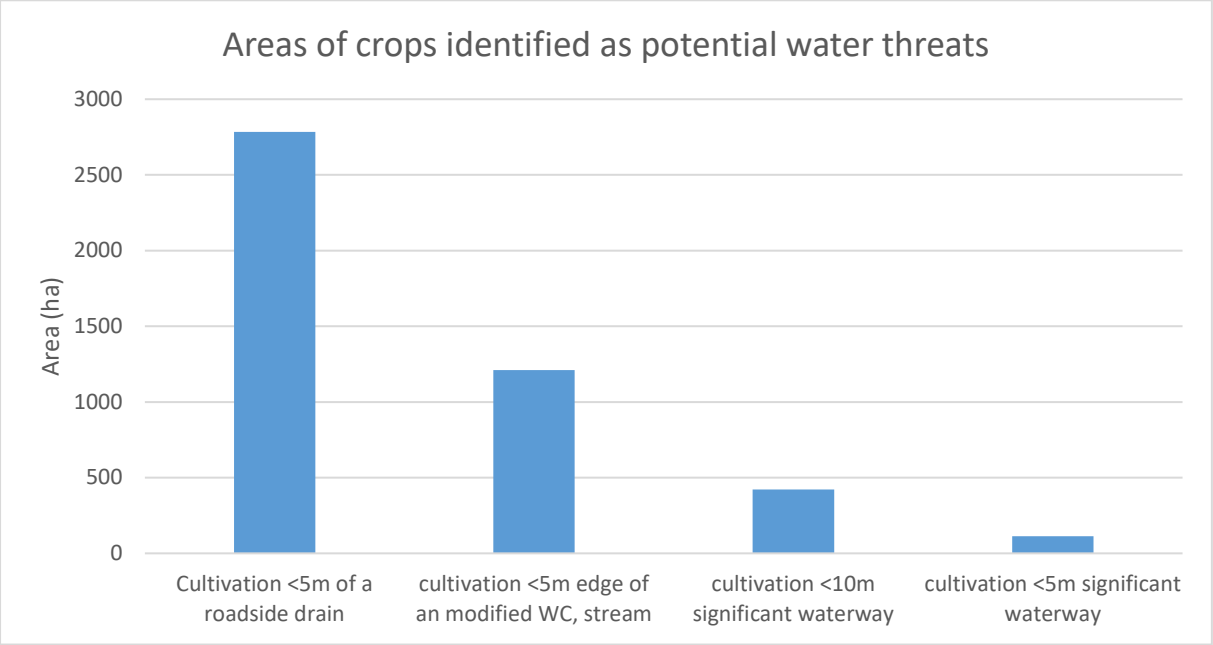

Figure 21. Proportion of land triggering rules within the Freshwater Chapter of the Tairāwhiti Resource Management Plan and identified as a water threat.

Possible non-compliant cropping area.

5.0 Limitations

5.1 Survey Area

The survey area for the Gisborne region 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.

The main limitation for this survey was a lack of visibility of crops and waterways from the road. This poor visibility was caused by lack of access into private properties, physical barriers obstructing view (wind breakers, buildings, hills, etc), and at times, poor weather conditions due to ex-cyclone Hale.

To improve our visibility of crops and waterways remote sensing, or the Councils drone could be used, however this would cause the survey to be more expensive, more time consuming, and permission from landowners would be required. If there is a large area of land not visible, then the landowners should be contacted to confirm the crops in the area. If crops can be identified but their distance from a waterway is not visible, then aerial photography can be used to estimate the distance and 'TBC' can be noted in the comments.

Ex-cyclone Hale took place during the surveying period, causing low visibility due to heavy rain and road closures, and meant the survey was not able to take place on one of the days during the surveying period. It is important to note the coastal areas which were most effected by the cyclone were surveyed before the cyclone occurred as the cyclone may have caused some crops to be heavily damaged by the rain and flooding, potentially altering the cropped land in the area.

5.2 Survey Method

As stated in Section 2.0, this was the fifth year that the summer crop survey was done using a handheld tablet rather than recording the information on aerial maps. Two people conduct the surveying with one person entering the information on the tablet, whilst the other person drives. Densely cropped areas such as the Poverty Bay Flats require more pulling over, while coastal areas tend to require longer periods of driving between cropped land. Having two people conducting the survey allowed for data collection to be efficient. It is recommended that the same two people do the crop survey to maintain consistency in identification.

The software used to collect the crop data was Arc Collector, with the app Field Maps. 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 more efficiently as most crop areas and crop type remained the same as the previous year. This method also reduced the time of the survey as the digitising was done in the field.

Digitising the data not only reduced the time of the survey, but 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 be reduced by excluding non-summer crops, such as pasture and to-be planted/tilled land which covered a large portion of the land surveyed (9,482.7 ha). Pasture was only recorded if the land area had previously been documented as having summer crops present. To-be planted/tilled land is important to record due to the implications of bare land exposure on water quality, where there is an increase in the likelihood of sediment running off the paddocks into nearby waterways.

The 2022/23 Summer Crop Survey began on the 4th of January 2023 and finished on the 24th of January 2023, around the same dates as the previous surveys. In previous years, the summer crop survey has always begun on a date within the first two weeks of January and has been completed within the last week of that month. The timing of the summer crop survey varies the results each year, as only the crops present during the time of the survey are recorded.

6.0 Conclusion

In summary, the 2022/23 Summer Crop Survey covered a total of 24,358.22 hectares. 13,252.5 hectares were recorded as summer crops, with pasture, not-visible and to-be-planted/tilled land being excluded. Maize and sweetcorn were the most dominant crop types covering 5785.5 hectares, followed by grapes covering 1,584.2 hectares, citrus covering 1,549.9 hectares, kiwifruit covering 798.6 hectares, chicory covering 671 hectares, apples and pears covering 603.7 hectares, and squash covering 370.3 hectares. These values show that a large area of land is being utilised during the summer period for cropping practices. A focus on the Taruheru Catchment showed long term trends in commercial cropping which may be partially responsible for the deteriorating trends in water quality observed in the Taruheru River.

Water threatened areas were identified that did not comply with the Freshwater Rules in Chapter C6 of the TRMP that came into effect on the 1st of May 2021. The total area classed as having a water threat went from 4,983 hectares in 2021/22 to 4,530.8 this year. This amounts to 19.2% of the total land surveyed in the Gisborne region. There has been a decline in the area classed as having a water threat in this year's survey compared to the previous year's survey (2021/22), decreasing by 452.2 hectares.

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

7.0 Appendices

Appendix 1 – Full results from the Summer Crop Survey 2022/23

Sum of Area (ha)	Locality					
Crop	**East Cape/Ruatoria**	**East/Tolaga/Tokomaru**	**Mōtū/Mātāwai**	**Poverty Bay Flats**	**Te Karaka/Whatatutu**	**Total (ha)**
Apples and Pears				549.7	54.0	603.7
Avocados				78.3	0.4	78.8
Baleage	56.8	28.6	87.9	18.9	20.3	212.5
Cauliflower/Broccoli				18.3		18.3
Chicory	114.8	159.4		227.1	169.7	671.0
Citrus	10.7	35.8		1488.6	14.8	1549.9
Clover	17.3	116.8		39.0	3.2	176.4
Courgettes				31.0		31.0
Feijoa		10.1		35.2		45.3
Flowers				1.7		1.7
Forage rape	1.0		9.8	24.1	6.7	41.7
Grapes		0.6		1466.1	117.6	1584.3
Kiwifruit		16.4		773.1	9.1	798.6
Leafy Turnip		33.8	23.7	64.1	1.4	123.0
Lettuce/Cabbage				56.7		56.7
Lucerne	119.8	66.4		121.3	53.2	360.6
Lupin					1.8	1.8
Maize/Sweetcorn		1029.4		3801.4	954.6	5785.5
Melons				17.7		17.7
Not Visible	49.8	44.4	96.0	972.3	456.2	1618.9
Oats				5.4		5.4
Olives	2.3			5.5		7.7
Other/Unknown	0.4	129.7		43.5	1.4	175.0
Pasture/Unused	2200.0	1255.0	616.8	3719.9	1273.3	9065.0
Persimmon				89.5	2.0	91.5
Pine Nursery				4.5	43.1	47.5
Pinenuts				1.5		1.5
Plantain	30.7	69.6		4.5		104.9
Plantain/Chicory	26.7	15.0		20.9	2.1	64.8
Plantain/Clover	17.6	4.0		1.9	15.4	39.0
Pomegranate				0.5	1.1	1.7
Poplar/Willow Nursery	0.6			10.8		11.4
Squash		14.4		257.8	98.0	370.3
Stonefruit				14.6	5.4	20.1
Strawberries				0.2		0.2
Swedes				1.4		1.4
Tamarillo				6.0		6.0
To Be Planted			0.9	416.8		417.7
Tomatoes				120.6		120.6
Yarrow	9.2	41.8		8.0		59.1
Grand Total (ha)	2657.8	3037.5	835.2	14518.5	3305.1	24354.1
Crop Total (ha)	**407.9**	**1738.1**	**121.4**	**9409.5**	**1575.6**	**13252.5**

Appendix 2 – Full results from the Taruheru Catchment over time

Crop (ha)	2007/08	2008/09	2009/10	2010/11	2011/12	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23
Apples and Pears	99.5	64.8	58.2	49.3	52	48.3	32	64	110.3	105.9	97.7	140.4	155.5
Avocados	18.4	11.4	13.7	29.2	35.2	13.6	16.5	16	20.2	20	33.6	31.7	35.3
Baleage									1.8	1.8	7.6	19.8	9.9
Cauliflower/Broccoli	10.4	60.9	6.9	12.2	41.3	19.2	33.3	14.2	15.5	16.7	49	43.2	
Chicory									2.1	56.6	31.5		
Citrus	427.6	538.2	537	533	556.4	548.5	541.7	539.1	518.8	507.2	596.9	558.9	546.7
Clover									13.6	10.6	25.6	6.8	6.8
Courgettes							1.3	1.4				60.2	31
Feijoa						9.7	21.7	24.2	24.8	25.4	27.9	18.1	16.6
Flowers								0.6	0.6	0.6	0.6	0.6	0.6
Fodder Beet									7.8				
Forage rape									19.7				24.1
Grapes	574.7	591.3	569.8	583.7	641.4	446.3	444.6	444.5	397.4	399.4	387	422.5	470.5
Kiwifruit	136.7	191.8	219.2	220.8	219.3	216.6	254.1	201.3	202.9	269.9	314.5	339.7	336.1
Leafy Turnip							36.9	20.1	39	23	0.7	11.3	39
Lettuce/Cabbage	42.8	60.6	15.2	9.5	42.1	55.9	73.6	94.1	79.4	129.7	47.7	42.3	56.7
Lucerne			7.9	27.3		4.6	12.9	7.2	2.9		23	15.7	28
Maize/Sweetcorn	639.3	879	935.5	853.8	848.9	1035.1	919.5	788.8	739.7	724.1	657.4	665.8	693.7
Melons	54.4	4.9	17.8	30.9	18.2	3.1	1.5	31.6	3	0.1	0.8		17.7
Olives						0.4	0.7	1.7	1.3	1.3	1.2	1.2	1.2
Onions			1.7										
Other								30.8	15.8	39.1	70.5	10.6	17.4
Peas/Beans	1.3				51.1								
Persimmon	40.7		4.9	30.7	30.7	44.7	13.9	59.1	59.5	59.5	66	64.6	53.9
Pine Nursery								0.1	0.5	0.5	1.4	1.4	1.4
Plantain						27.9	10.8	5.9	5.2				
Plantain/Chicory									0.9	4.8	4.8	3.4	2.3
Plantain/Clover								49.5	5.6				
Pomegranate							1.2	1.5	1.6	0.6	0.2		
Squash	306.6	243.9	274.9	347.3	439.5	340.6	403	190.4	269.2	284.8	331.8	104.4	81.6
Stock Feed/Baleage							0.3						
Stonefruit	8.6	35.8	35.2	36.1	40	21	44.3	33.8	18.6	23.1	12.2	12.9	13.3
Strawberries			5.5	0.8	1.5		0.3	0.3	0.1				
Tamarillo	6.4		29.5	11.8	11.8	0.7	3	5.1	7	7.3	8.4	6.0	4.3
Tomatoes	257.1	141.3	211.2	208.2	111.6			22.3	36.3	4.3	24.6	42.9	13.2
Yarrow													1.8
Grand Total (ha)	**2624.5**	**2823.9**	**2944.1**	**2984.6**	**3141**	**2836.2**	**2867.1**	**2647.6**	**2621.1**	**2716.3**	**2822.6**	**2624.4**	**3645**

Appendix 3 - Tairāwhiti Resource Management Plan

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.*

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 intensively farmed stock activities will require a resource consent to continue.*

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, expect 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.

Appendix 4 - Definitions

Definitions:

Modified watercourse: *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.*

Intermittent stream: *A stream that flows seasonally when the water table is high, such as during and after periods of heavy or steady rain. An intermittent stream has:*

- a defined water channel and banks; and
- connects with a permanently flowing surface water body; and
- provides habitat for aquatic flora and/or fauna species.

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