2021/22 SUMMER CROP SURVEY

Gisborne District Council

ABSTRACT

The 2021/22 Summer Crop Survey report details the seventh survey of the summer crops grown throughout the Gisborne District.

Pearl Ruston, Karepa Maynard and Isabella Clere

Summer Students – Environmental Science Team

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Executive Summary

The 2021/22 Summer Crop Survey is the seventh survey to detail the type, location and total area of different summer crops in the Gisborne district. A total of 24,289.2 hectares was surveyed, of which 13,360.5 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 (5,376.8 hectares), followed by citrus (1503.9 hectares), grapes (1395.95 hectares), squash (970.1 hectares), kiwifruit (775.2 hectares) and apples/pears (567.8 hectares).

Crops by location

- Poverty Bay Flats had the largest area of summer cropped land (9415.4 hectares) with the most diverse summer crop varieties.
- East Coast/Tolaga/Tokomaru had the second largest area (1638.9 hectares), followed by Te Karaka/Whatatutu (1416.3 hectares), East Cape/Ruatoria (689.3 hectares), and Motu/Matawai (200.7 hectares).

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 2021/2022 looks at long term trends in commercial cropping in the Taruheru Catchment over the past 14 years.
- 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 2624.4 hectares in this years (2021/22) survey.
- Maize and sweetcorn had the greatest cropping area in both 2007/08 and the 2021/22 summer crop survey, kiwifruit has increased over time from 136.7 hectares in 2007/08 to 339.7 hectares in 2021/22. Grapes decreased from 574.7 hectares in 2007/08 to 422.5 hectares in 2021/22 and squash declined from 306.6 hectares in 2007/8 to 104.4 hectares in 2021/22.

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 Tairāwhiti Resource Management Plan.
- Areas that pose a threat to waterways are all crops excluding pasture and permanent crops.
- 4978 hectares of land in the Gisborne region has been recognised as having a threat to water, this was 20% of total surveyed area, and 46% of the cropped area which has a potential threat to water (excluding pasture and permanent crop area). Another 23% of area was “not-visible” and therefore the water threat potential cannot be determined.

1.0 Introduction

The Environmental Science Team from Gisborne District Council has completed a survey of the commercial summer crops grown throughout the Gisborne district for the 2021/22 summer season. This is the seventh 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. 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 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 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 2021/22 Summer Crop Survey began on 11th of January 2022 and finished on the 27th of January 2022. The survey took 13 working days to complete over 17 days. Consequently, the survey was not conducted on consecutive days due to the weekends.

The Muriwai area was surveyed first, followed by Waingake/Tiniroto, Wharekopae, Motu/Matawai, Whatatutu/TeKaraka, Patutahi, Poverty Bay flats, Tikitiki/Ruatoria and Tolaga Bay. The more northern coastal areas that were surveyed included the area around Ruatoria and 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, 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 Tairāwhiti Resource Management Plan. Prior to heading out each day, maps were printed off GISeConservation maps and used to determine whether 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 significant waterways were involved but not visible, the Aerial base layer on ArcGIS was utilised to estimate distance. If cropping appeared to be less than 10 meters from a significant waterway, the rule was breached, and a note was made 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. A pair of binoculars were available and used for identifying some crops that the naked eye could not. If it 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'.

Last year the survey began with one day of surveying in late December, then continued within the first two weeks of January and was completed within the second to last week of that month. This year like the year prior to last (2019-2020), surveying began in the first two weeks of January and was completed within the last week of the month. Therefore, the crop survey was fulfilled within the same cropping period to enable crop identification to be maximised.

This specific method where data was collected using Arc Collector software, has been used for the summer crop surveys for a total of four 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 2020/21 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. Motu/ Matawai
2. East/ Tolaga/ Tokomaru
3. East Cape/ Ruatoria
4. Te Karaka/ Whatatutu
5. Poverty Bay Flats

Crop Survey Area

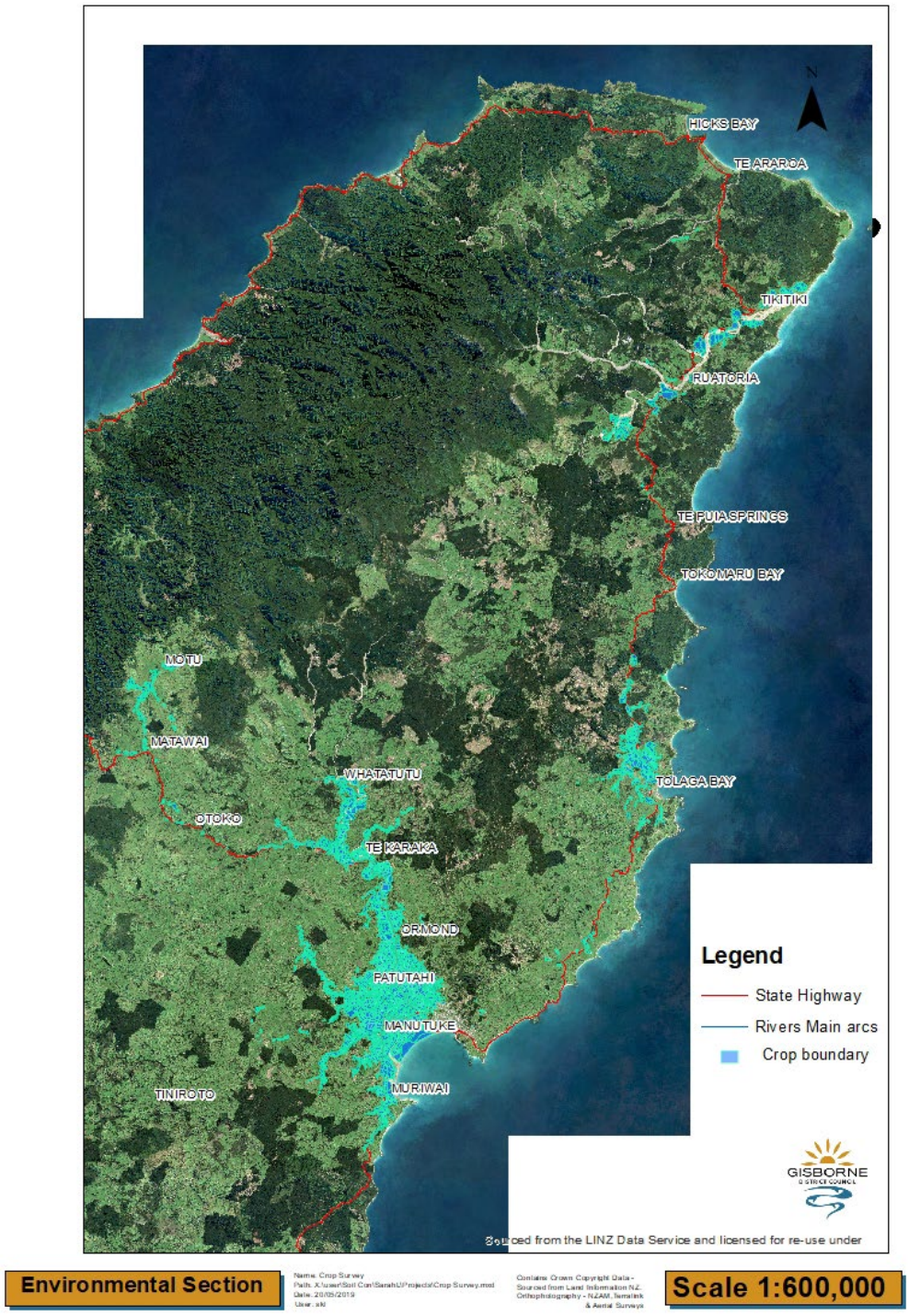

Figure 1. Aerial imagery (2017) showing average extent of area surveyed in the summer crop survey.

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 were not visible, were identified as 'not-visible'. Crops that were not recorded in the 2020/21 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 area which had been developed into houses or industrial building was removed from the 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
Grape nursery	Potatoes
Grapes	Squash
Kiwifruit	Stock feed
Leafy turnip	Stonefruit
Lettuce/cabbage	Strawberries
Lucerne	Tamarillo
Lupin	To-be-planted/tilled
Maize/sweetcorn	Tomatoes
Melons	Yarrow
Not-visible	

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 2021/22 Summer Crop Survey.

For the entire Gisborne region, the area of summer crops excluding pasture, not-visible and to-be-planted/tilled land was 13,360.5 hectares. The total area surveyed and recorded was 24,289.2 hectares. The area of pasture/unused (9027.091 ha), not-visible (1265.0874 ha) and to-be-planted/ tilled land (636.4952 ha) was excluded to calculate the total area of summer crops. This is because pasture generally has a lower impact on soil and waterways, as pasture is generally not as intensely irrigated or fertilised compared to commercial crops. Not-visible land was also excluded as the potential impacts on the soil and waterway cannot be determined. To-be-planted/tilled land impacts include; the risk of the bare soil eroding into waterways, and seeds/seedlings intensively irrigated and fertilized. However, to-be-planted/tilled land is generally short term, and the crop to be planted is unknown so therefore future impacts are also unknown.

The 2021/22 survey had a reduced total area of summer crops (13,360.5 ha) compared to the 2020/2021 survey of summer crops (15,432.6 ha). No access into private properties for the survey this summer reduced the visibility of crops, and therefore not included in the total area of summer crops. This may explain the reduction in total area of summer crops.

The total area in hectares (ha) of each summer crop surveyed in the Gisborne region can be seen in Table 2.

Table 2. Total area in hectares (ha) of each crop type identified in the 2021/22 summer crop survey

Crop	Area (ha)	Crop	Area (ha)
Apples and pears	567.8	Olives	8.3
Avocados	79.1	Other/unknown	276.5
Baleage	249.2	Pasture/unused	9027.1
Cauliflower	79.1	Persimmons	94.7
Chicory	533.9	Pine nursery	47.5
Citrus	1503.9	Pinenuts	1.5
Clover	68.8	Plantain	70.8
Courgettes	60.2	Plantain/chicory	97.8
Feijoa	49.2	Plantain/clover	41.6
Flowers	2.0	Pomegranate	1.7
Forage Rape	94.1	Poplar/willow nursery	11.4
Grapes	1396.95	Squash	970.1
Kiwifruit	775.2	Stock Feed	31.9
Leafy Turnip	253.5	Stonefruit	20.6
Lettuce/cabbage	43.7	Strawberries	35.2
Lucerne	319.5	Tamarillo	6.0
Lupin	1.8	To-be-planted/tilled	636.5
Maize/sweetcorn	5376.8	Tomatoes	148.9
Melons	3.9	Yarrow	38.3
Not-visible	1265.1		

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 (ha) that they covered. Major crops from this year's summer crop survey (2021/22) can be seen in Table 3. The six major crop types (highlighted in green) were analysed to test if there were any long-term trends over the seven summers of sampling, these trends can be seen in Figure 2. 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

Crop type	Hectares (ha) total
Pasture/unused	9027.1
Maize/sweetcorn	5376.8
Citrus	1503.9
Grapes	1395.95
Not-visible	1265.1
Squash	970.1
Kiwifruit	775.2
To-be-planted/tilled	636.5
Apples and pears	567.8

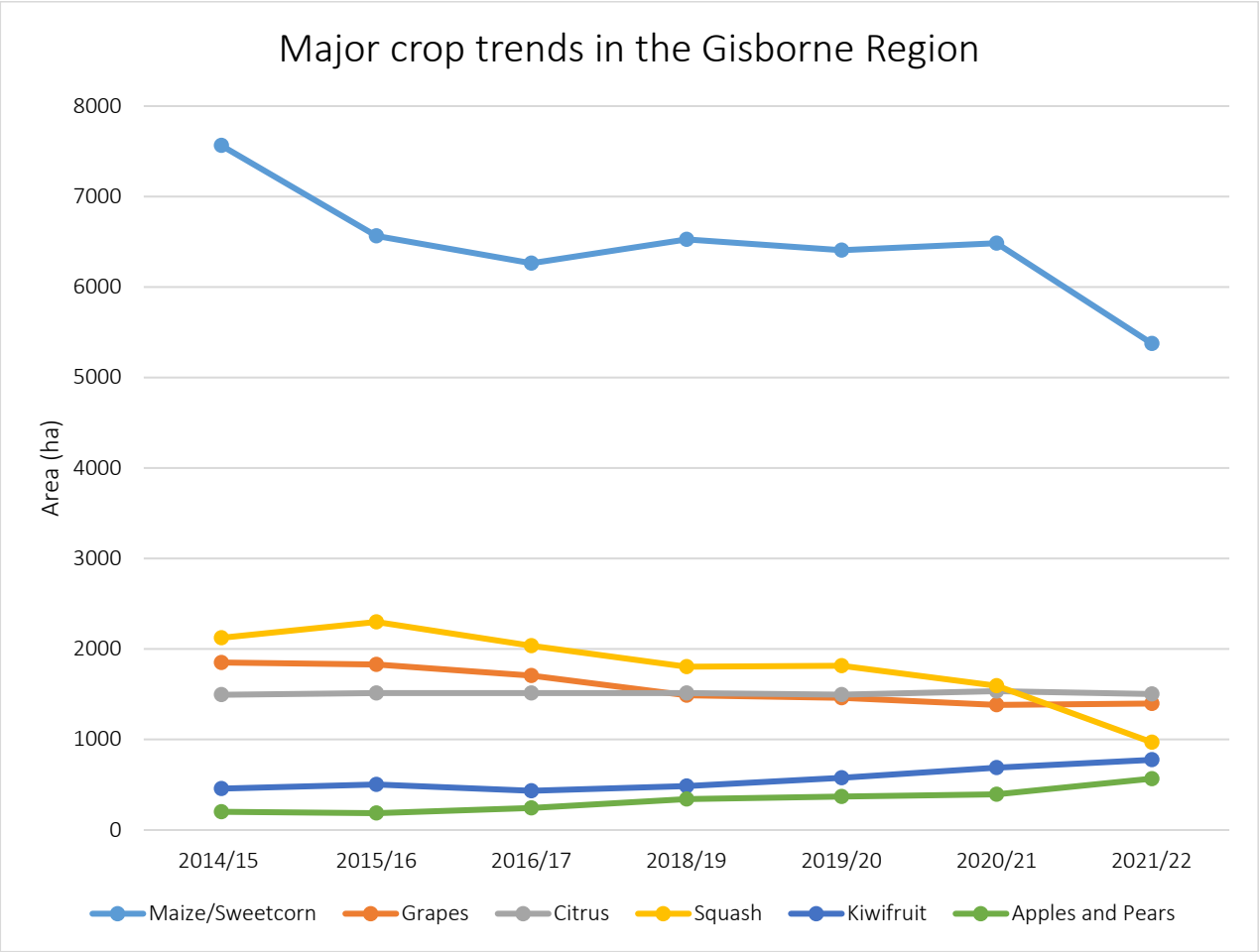

Figure 2. Seven year major summer crop trends in the Gisborne region

3.1.1 Maize/Sweetcorn

Maize and sweetcorn were the most abundant crops in the Gisborne region. Maize and sweetcorn account for 40% of all crops recorded in the Gisborne region (excluding pasture, not-visible and to-be-planted/tilled land), covering 5376.8 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:

Overall, the trend for maize and sweetcorn is decreasing as seen in Figure 3, with a major drop from 2014/15 to 2015/16, then the area appears to be around approximately 6,500 hectares for the following three years. This year there was a further 1,108.7 hectare decrease. These trends could be attributed to a large proportion of crop land transitioning to apple, pear and kiwifruit orchards. However, this significant decline could also be attributed to the increase in crops which were not visible.

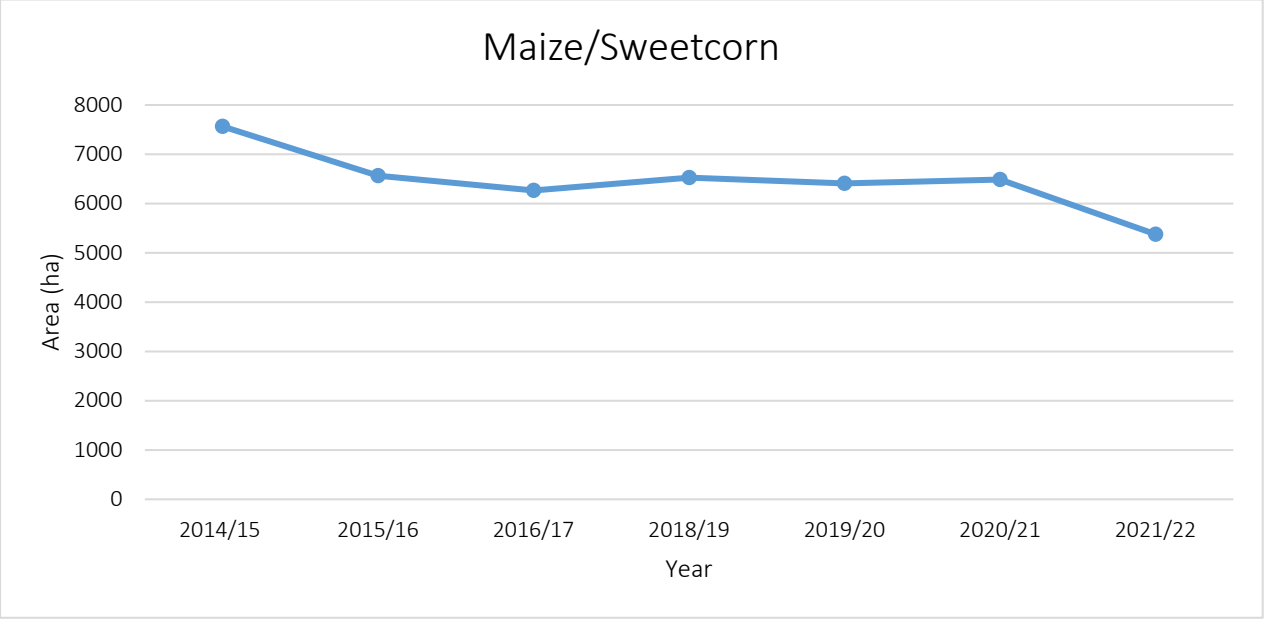

Figure 3. Seven year trend of the total area in hectares (ha) of maize/sweetcorn in the Gisborne region (2014/15 – 2021/22)

3.1.2 Citrus

The total area of the citrus crop was 1503.9 hectares. The citrus crop 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 approximately 11% of the total summer crops recorded in the region.

Observations and trends:

As seen in Figure 4, the trend for citrus crop area (ha) began to fluctuate from 2018/19, where area decreased into 2019/20, and the next year (2020/21) there was an observed increase in area, and this year there was an observed decrease. This may be due to the conversion of land into kiwifruit, apples and pears, or land not being visible during the survey.

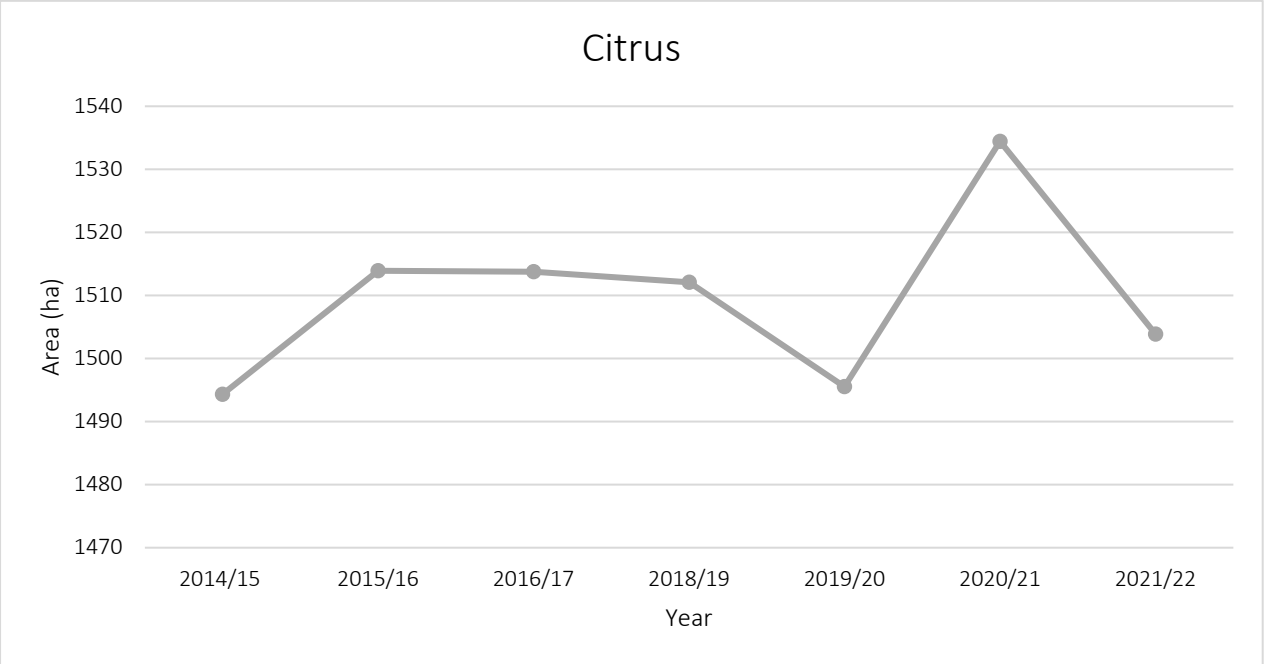

Figure 4. Seven year trend of the total area in hectares (ha) of Citrus in the Gisborne region (2014/15 – 2021/22)

3.1.3 Grapes

Grapes are another common crop identified in the Gisborne region. The area of grapes covered 1395.95 hectares, making it the third most abundant summer crop in the region, accounting for 10% of the total summer crops surveyed in the region.

Observations and trends:

The area in hectares (ha) of grapes has been compared to the previous summer crop surveys. Grapes have shown a steady decrease in area since surveying began. In 2014/15, grapes covered 1,851.1 hectares and have dropped to 1395.95 hectares in 2021/22, as seen in Figure 5. This could be due to a conversion of grapes into other crops such as kiwifruit, apples or pears.

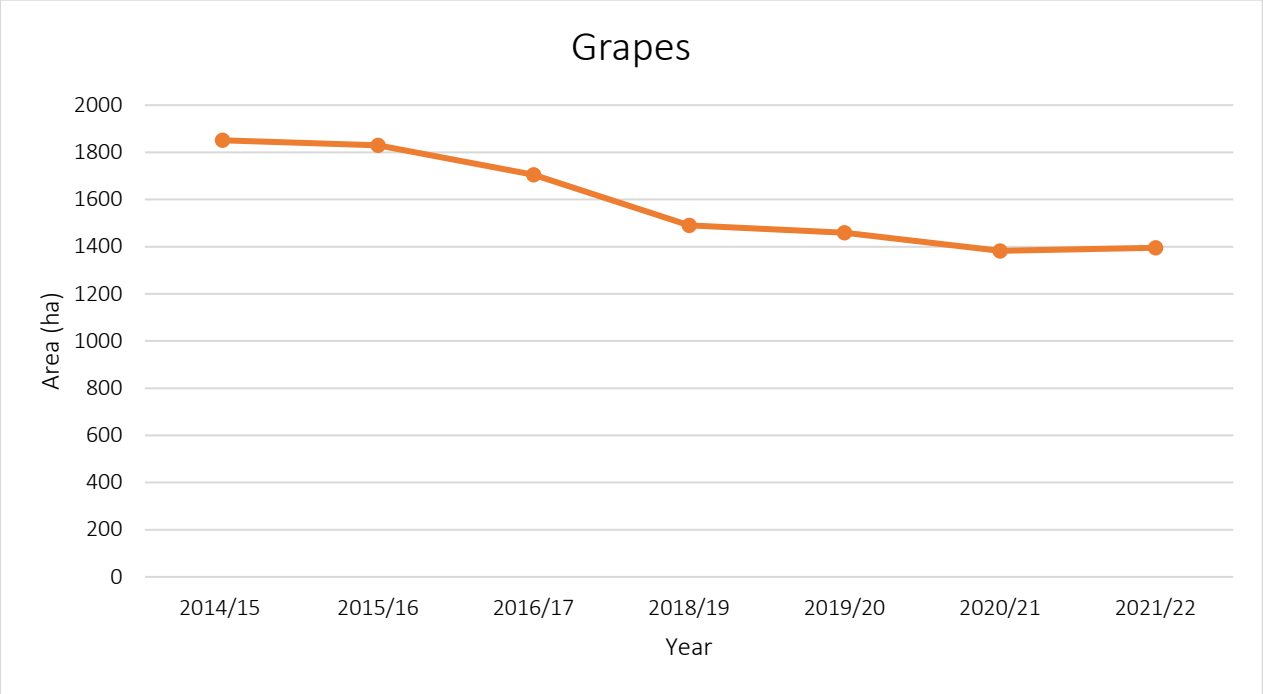

Figure 5. Seven year trend of the total area in hectares (ha) of grapes in the Gisborne region (2014/15 – 2021/22)

3.1.4 Squash

Squash was the fourth most abundant crop type identified in the Gisborne region, covering an area of 970.1 hectares. Squash accounts for 7% of all crops recorded in the Gisborne region (excluding pasture, not-visible and to-be-planted/tilled land). The squash crop encompasses butternut squash and pumpkin crops.

Observations and trends:

The area in hectares (ha) of squash crops have been compared to the previous summer crop surveys and trends have been observed (Figure 6). Squash crop area peaked in 2015/16 with 2,299 hectares and has since been on the decline, with this year making up 970.1 hectares, a large decrease from the 2020/21 summer crop season survey. This long term decline may be attributed to the diversification of what is grown in the region. Squash crops may have been unaccounted for due to a lack of property access and therefore classed as 'not-visible'. There is also potential that they were misidentified as courgettes.

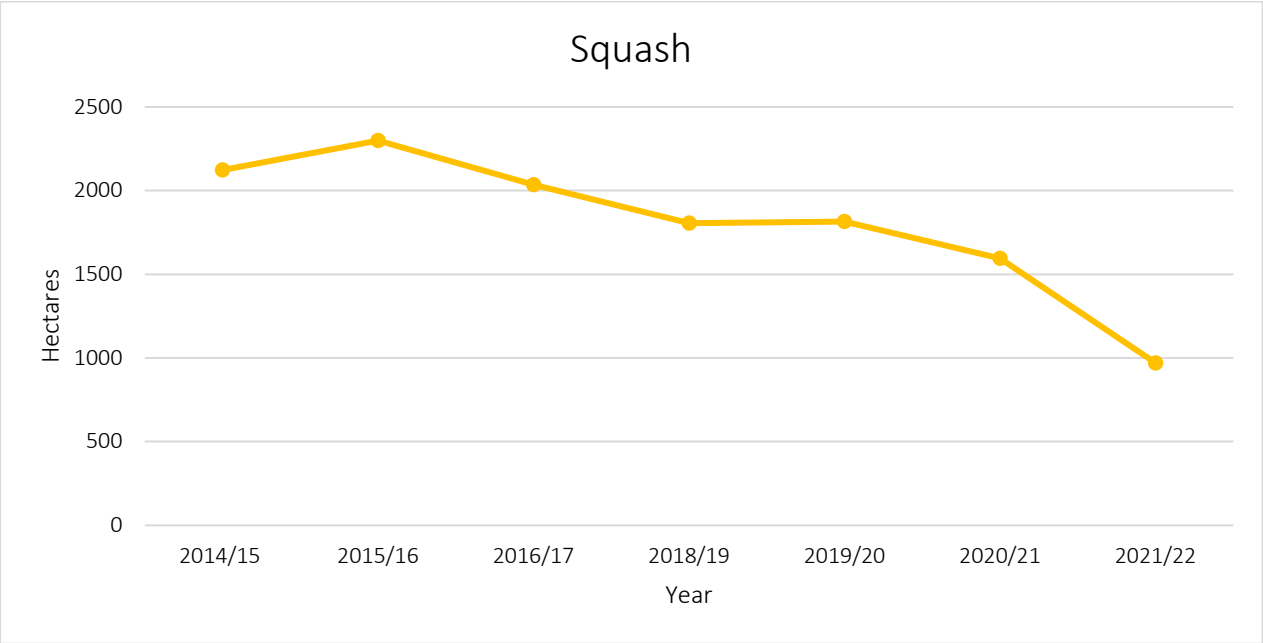

Figure 6: Seven year trend of the total area in hectares (ha) of squash in the Gisborne region (2014/15 – 2021/22)

3.1.5 Kiwifruit

The area of Kiwifruit recorded in this summers (2021/22) crop survey was 775.2 hectares. It was the fifth 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 and as seen in Figure 7, its area appears to have steadily increased each year since the 2018/19 crop survey. This trend is expected to continue to rise with installation of kiwifruit infrastructure observed during this summer's survey. However, as the kiwifruit had not yet been planted, it was not included in the kiwifruit total area. Therefore, the next summer crop survey should see an increase in kiwifruit area.

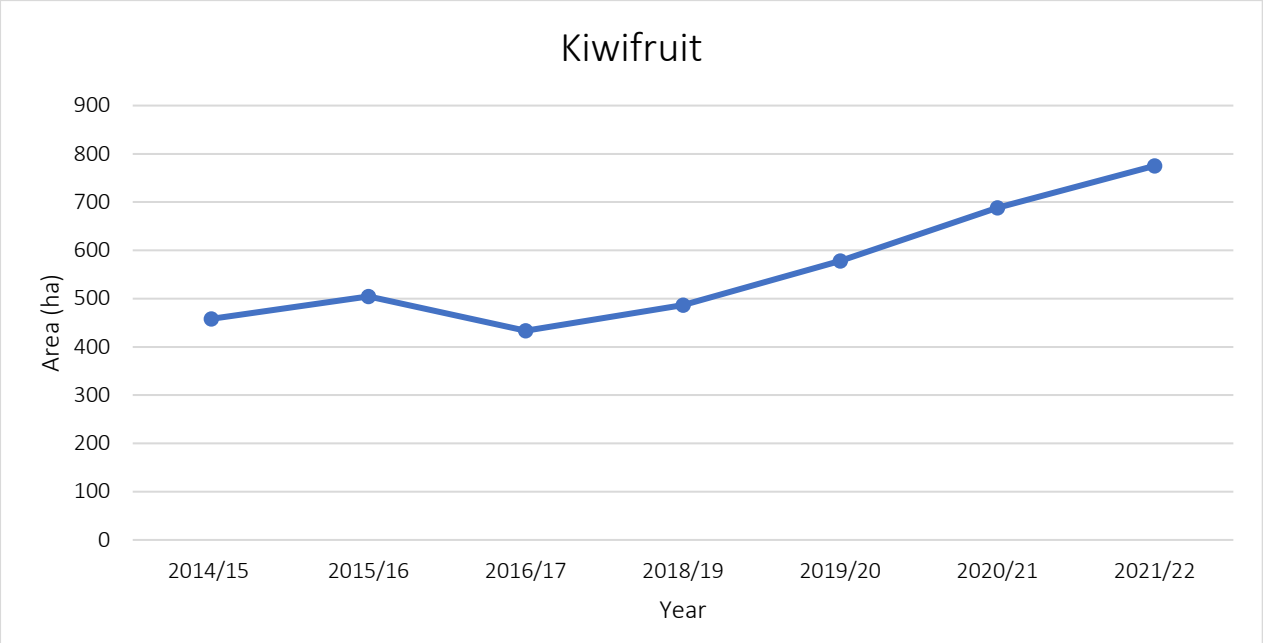

Figure 7. Seven year trend of the total area in hectares (ha) of kiwifruit in the Gisborne region (2014/15 – 2021/22)

3.1.6 Apples and Pears

Apple and pears are another common crop identified in the Gisborne region. The area of apples and pears recorded was 567.8 hectares, making it the sixth most abundant crop in the region contributing to 4% of the summer crops recorded in the Gisborne region (excluding pasture, not-visible and to-be-planted/tilled land). Apples and pears have been grouped together as the infrastructure is the same and due to their 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 8, the crop area of apples and pears has increased annually since the 2015/16 summer crop survey. This trend is expected to continue as installation of apple and pear infrastructure was observed during this summer's survey. However, as the apple and pear crops had not yet been planted it was not included in the crop total area this year. Therefore, the next summer crop survey should see an increase in the cropped area of apples and pears.

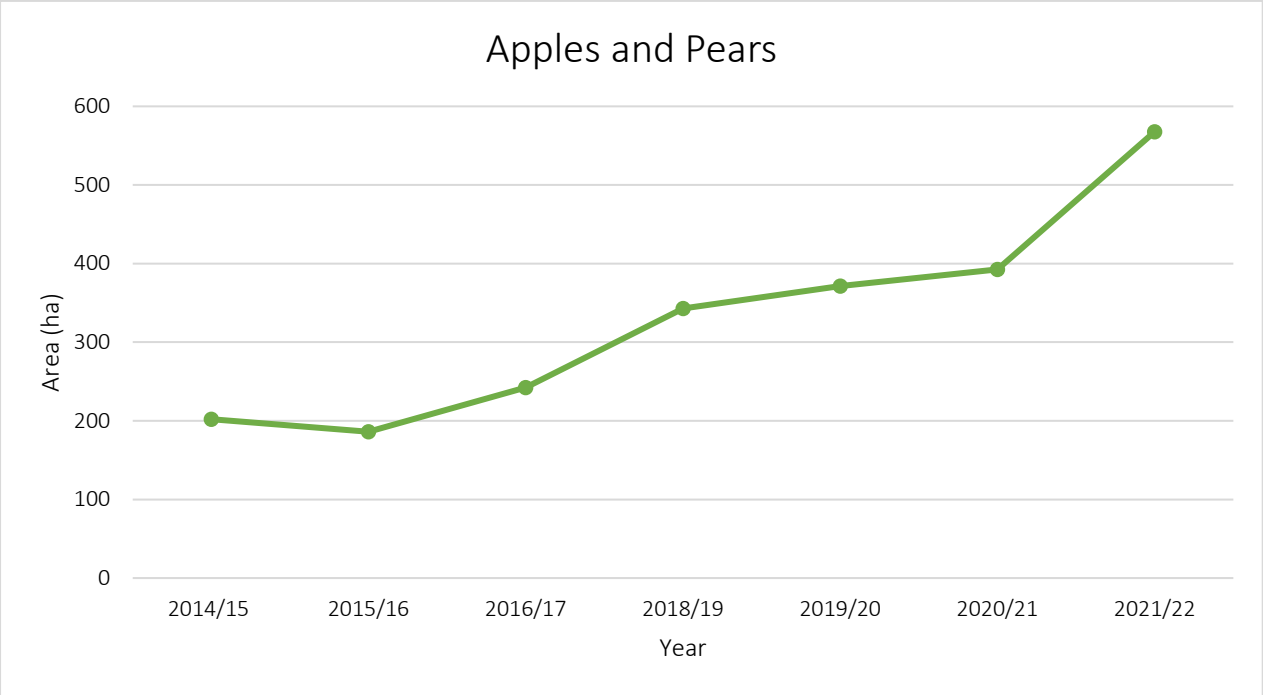

Figure 8. Seven year trend of the total area in hectares (ha) of Apples and Pears in the Gisborne region (2014/15 – 2021/22)

3.1.7 Not -visible

Not-visible had a total crop area of 1265.1 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 like wind breakers and hills, and distance.

3.2 Location

3.2.1 The Poverty Bay Flats

The total surveyed area for the Poverty Bay Flats region was 14575.2 hectares. The total area of pasture (3827.9 ha), not-visible (763.2 ha) and to-be-planted/tilled land (568.7 ha) was excluded to calculate the total area of summer crops, which was 9415.4 hectares. This area had the largest variety of crops in the district. The crop types found in this area can be seen in Figure 9.

The major crop type found in the Poverty Bay Flats region was maize and sweetcorn covering a total of 3602.06 hectares. Citrus was the second most abundant crop in this area with 1449.7 hectares followed by grapes with 1332.6 hectares, then kiwifruit with 749.7 hectares. Squash was found to be the fifth most common crop in the Poverty Bay Flats region covering 553.6 hectares of land. Apples and pears had 516 hectares, chicory had 181.7 hectares, tomatoes had 135.9 hectares, lucerne had 117.1 hectares and persimmon had 94.7 hectares of land. “Various crops” were identified as crops with low hectares that contributed to less than 1% of the total crop area in the Poverty Bay Flats in the 2021/22 Summer Crop Survey. Various crop types for the Poverty Bay Flats region have been grouped together in Figure 9 and expanded in Figure 10.

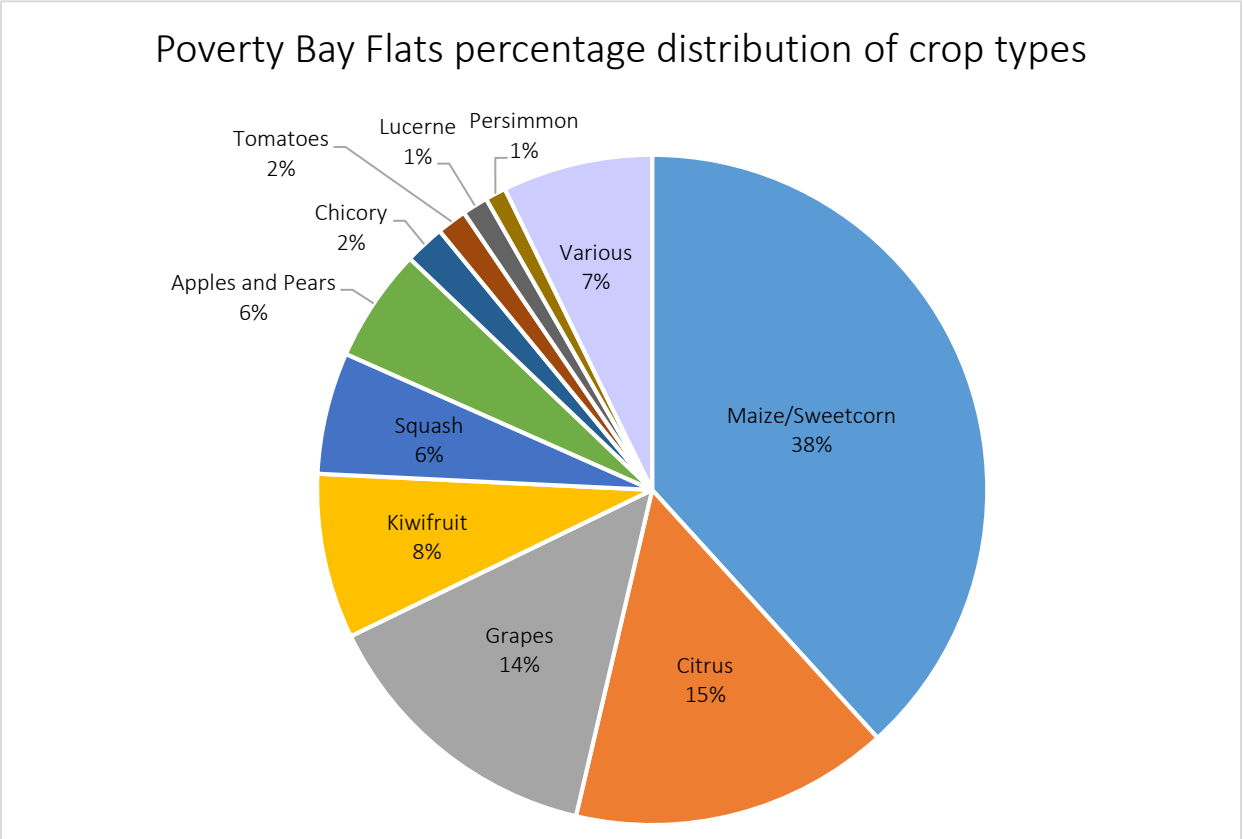

Figure 9. Crop Types recorded on the Poverty Bay Flats in % value by area (ha).

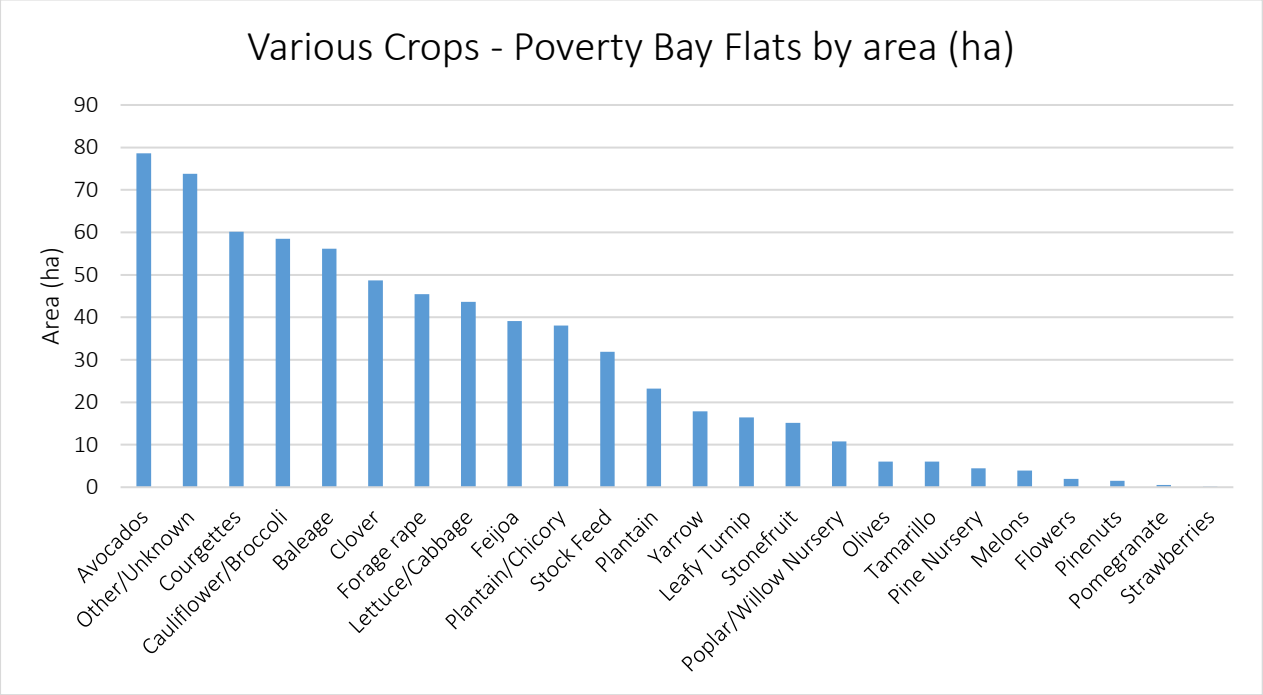

Figure 10. Various crop types in the Poverty Bay Flats breakdown.

3.2.2 East Cape/Ruatoria

The total surveyed area for the East Cape/Ruatoria region was 2,511.5 hectares. The area of pasture (1,822.2 ha), not-visible (0 ha) and land area that was to-be planted/tilled (0 ha) were excluded to calculate the total area of summer crops, which was 689.3 hectares, making this the fourth largest area of crops in the Gisborne district. The crop area distribution percentage can be seen in Figure 11. The most abundant crop in this area is chicory with 196 hectares, followed by lucerne with 145.1 hectares, and leafy turnip, the third most abundant crop with 111.1 hectares. The remaining crops including baleage, plantain/chicory, other/unknown, plantain/clover, plantain, yarrow, citrus, olives, forage rape and poplar/willow nurseries were found in much lower quantities.

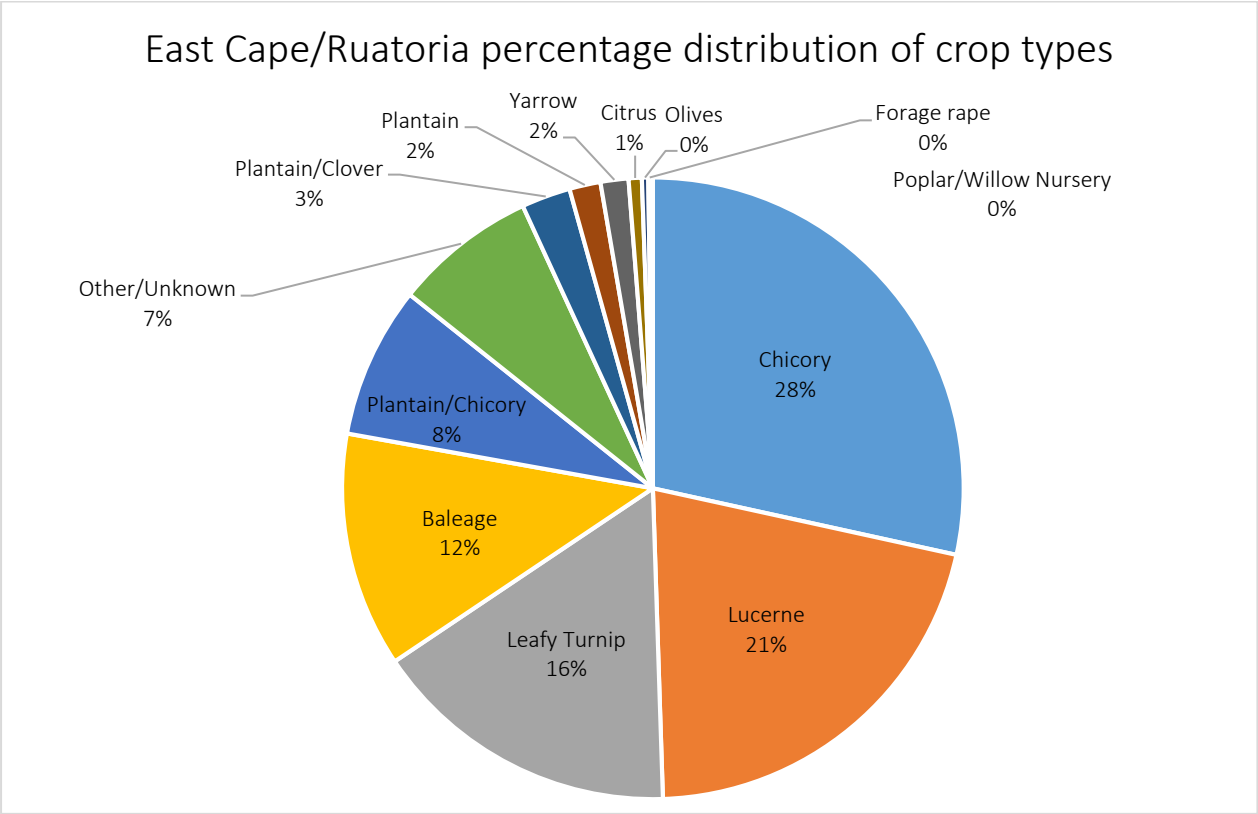

Figure 11. Crop Types recorded in the East Cape/ Ruatoria area in % value by area (ha).

3.2.3 East/Tolaga/Tokomaru

The total area surveyed for the East/Tolaga/Tokomaru area was 3044.8 hectares. The area of pasture (1401.8 ha), not-visible (0 ha) and land area that was to-be-planted (4.1 ha) was excluded to calculate the total area of summer crops, which was 1638.9 hectares. This was the second largest area of crops in the Gisborne region. The distribution of crop types can be seen in Figure 12. The major crop type found in this region was maize and sweetcorn with a total area of 1062.2 hectares. Squash was the second most abundant crop type in this region with a total area 132.6 hectares. Other/unknown made up 124 hectares, chicory made up 95.3 hectares. Plantain made up 20.3 hectares, citrus made up 35.8 hectares, leafy turnip made up 33.8 hectares, plantain/clover made up 20.3 hectares, clover made up 20 hectares, baleage made up 16.6 hectares, and kiwifruit made up 16.4 hectares. “Various crops” were identified as crops with low hectares that contributed to less than 1% of the total crop in the East/Tolaga/Tokomaru area in the 2021/22 Summer Crop Survey. Various crop types for the East/Tolaga/Tokomaru region have been grouped together in Figure 12 and expanded in Figure 13.

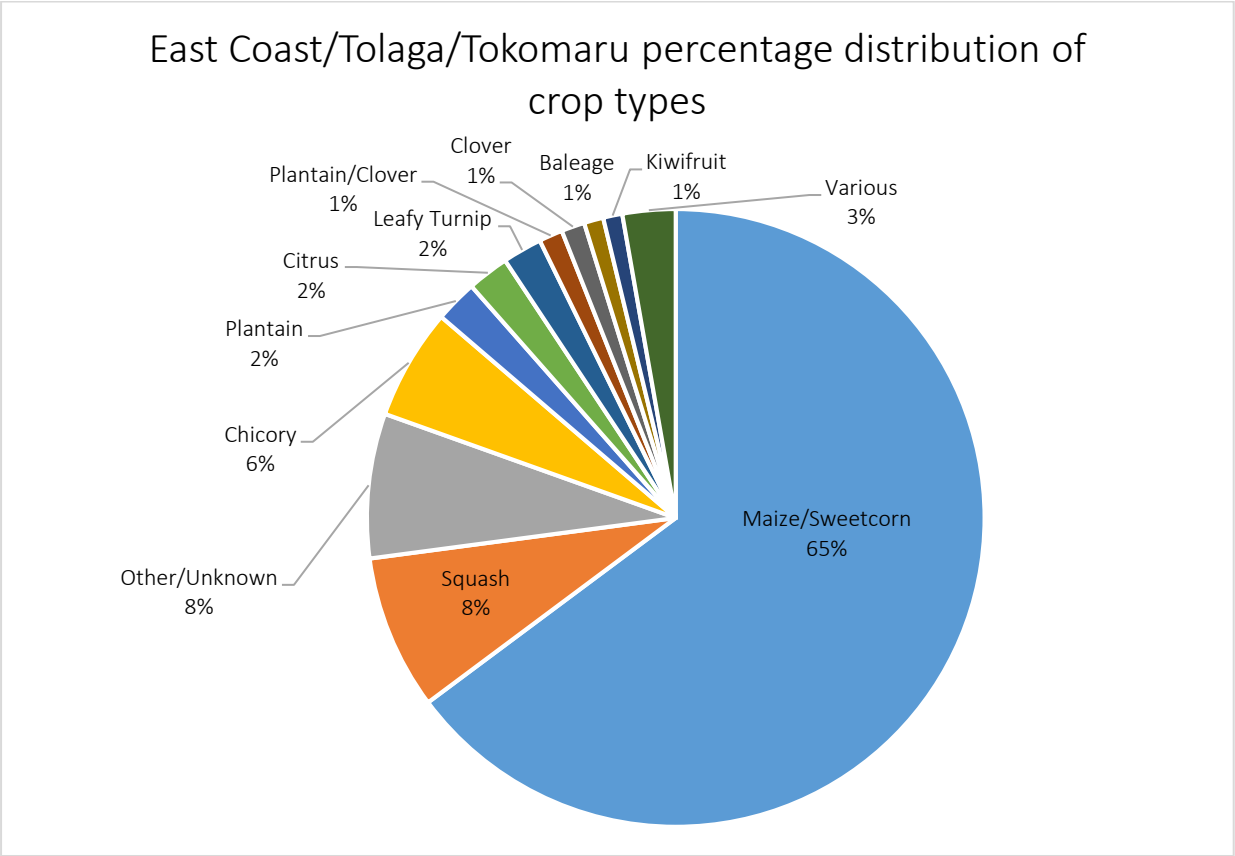

Figure 12. Crop Types recorded in the East/Tolaga/Tokomaru area in % value by area (ha).

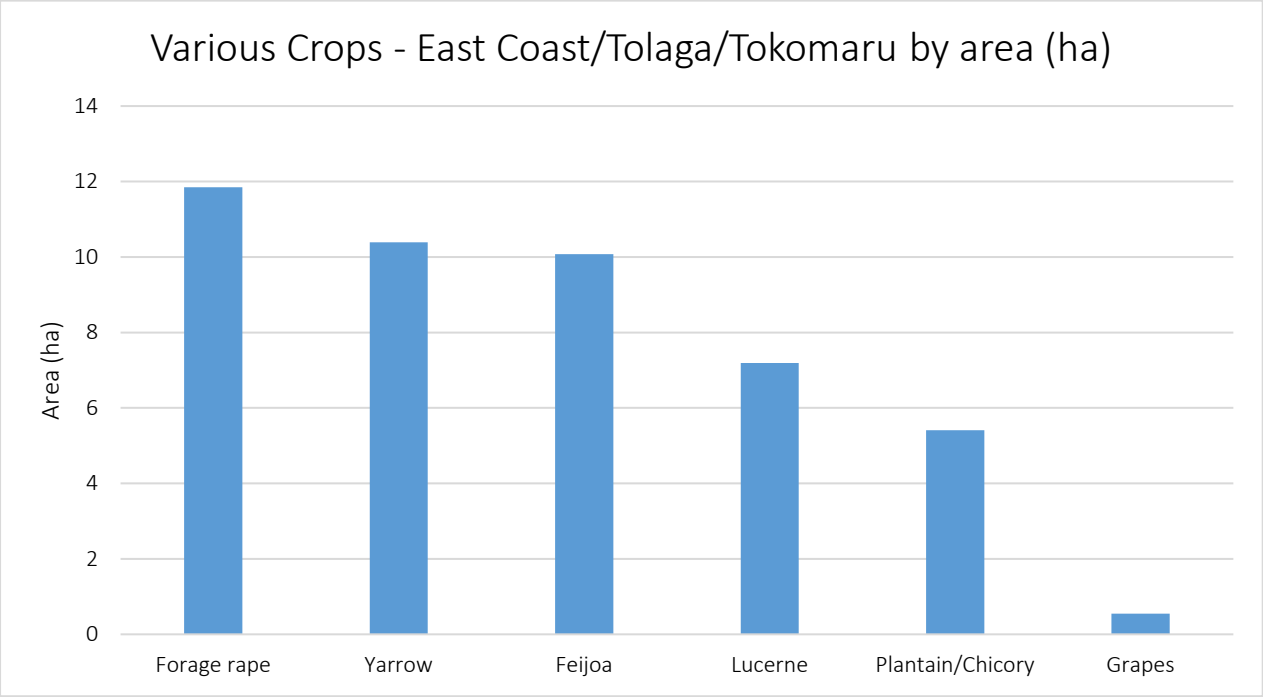

Figure 13. Various crop types in the East/Tolaga/Tokomaru breakdown.

3.2.4 Motu/Matawai

The total area surveyed for the Motu/Matawai area was 830.5 hectares. The area of pasture (617.9 ha), not-visible (1.7 ha) and the area of to-be-planted/tilled land (10.3 ha) was excluded to calculate the total area of summer crops, which was 200.7 hectares, making this the smallest area of crops in the Gisborne region. The total area of crop types found in this area can be seen in Figure 14. The major crop type found was baleage, which had 92.1 hectares. Other crop types found in the region were

leafy turnip with 74.6 hectares, forage rape with 15.3 hectares, chicory with 11.7 hectares, plantain/clover with 3.7 hectares and lucerne with 3.2 hectares.

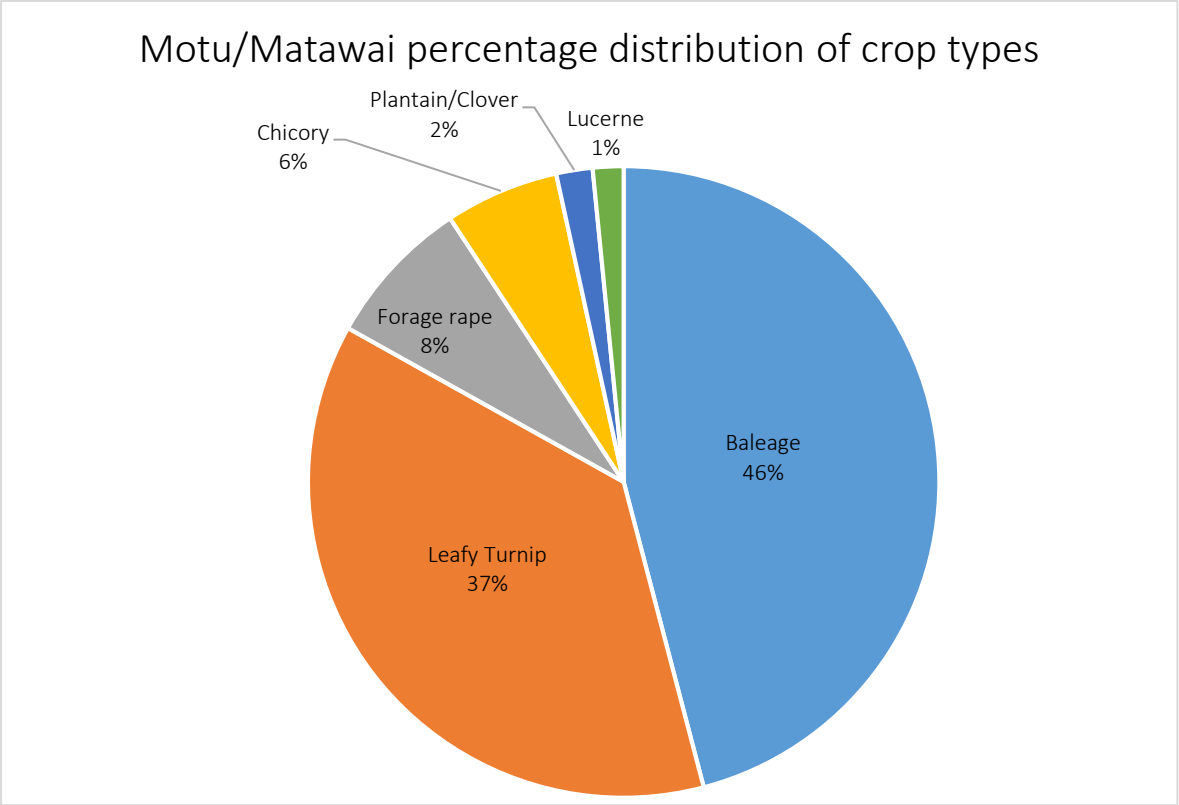

Figure 14. Crop Types recorded in the Motu/Matawai area in % value by area (ha).

3.2.5 Te Karaka/Whatatutu

The total area surveyed for the Te Karaka/Whatatutu area was 3,327.1 hectares. The area of pasture (1357.3 ha), not-visible (500.3 ha) and to-be-planted land (53.3 ha) were excluded to calculate the total area of summer crops, which was 1,416.3 hectares, making this the area the third largest area of crops in the Gisborne region. The total area of crop types found in this area can be seen in Figure 15 and 16. The major crop type found in this region was maize and sweetcorn with a total area of 712.6 hectares. The second most abundant crop type was squash with a total of 283.9 hectares, followed by grapes at 62.8 hectares. Apples and pears made up 51.8 hectares, chicory made up 49.2 hectares, lucerne made up 47 hectares, pine nursery made up 43.1 hectares, strawberries made up 35.1 hectares, other/unknown made up 27.6 hectares, cauliflower/broccoli made up 20.6 hectares, forage rape made up 20.4 hectares and leafy turnip made up 17.6 hectares. “Various crops” were identified as crops with low hectares that contributed to less than 1% of the total crop area in Te Karaka/Whatatutu in the 2021/22 Summer Crop Survey. Various crop types for the Te Karaka/ Whatatutu region have been grouped together in Figure 15 and expanded in Figure 16.

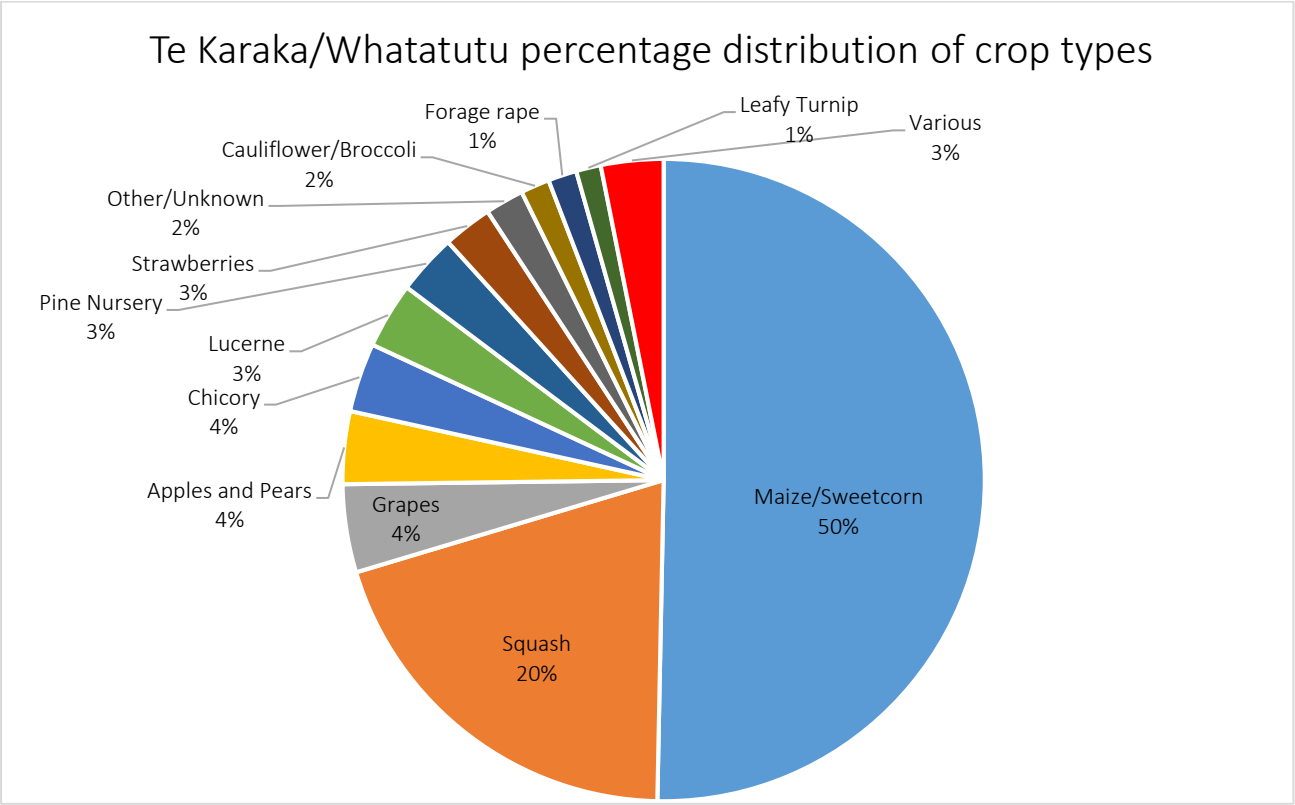

Figure 15. Crop Types recorded in the Te Karaka/ Whatatutu area in % value by area (ha).

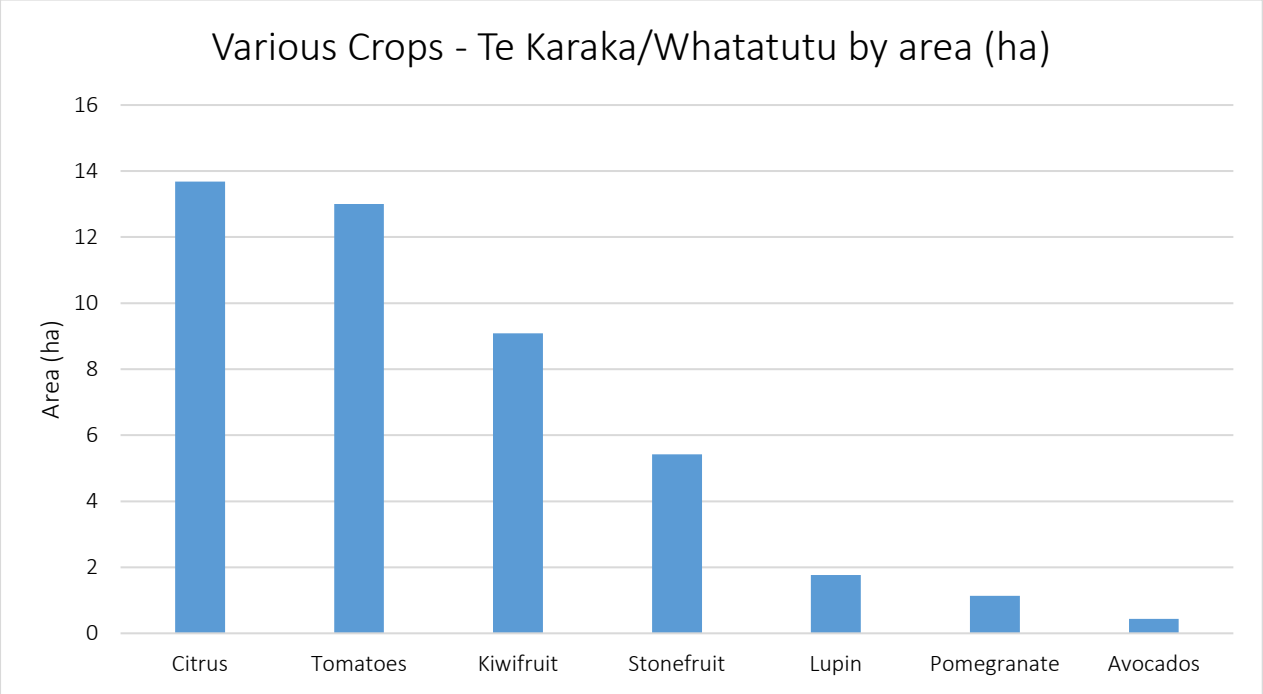

Figure 16. Various crop types in the Te Karaka/Whatatutu breakdown.

3.3 Taruheru Catchment

The Taruheru Catchment covers the area between Waihirere and Gisborne city, from the 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 (SOE) 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 (TRMP). 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 2022 (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 17.

Trends show that over the 13 years from 2007/08 to 2020/21 the area of cropped land in the Taruheru Catchment (excluding pasture, not-visible and to-be-planted/tilled land) increased by 197.5 hectares from 2,625 hectares to 2,822.5 hectares. This year there has been a decrease of 198.1 hectares from 2,822.5 hectares (2020/21) to 2624.39 hectares (2021/22). This may be attributed to the increase in crops that were not accessible and categorised as “not-visible” this year.

Maize and sweetcorn remain the most abundant crop with an area of 665.8 hectares in 2021/22. Kiwifruit has shown a large increase over the 14 years, going from 136.7 hectares in 2007/08 to 339.7 hectares in 2021/22. Lettuce and cabbage has fluctuated over the survey years, with a low of 9.5 hectares and a high of 129.7 hectares in 2019/20, with this year (2021/22) the crop covering 42.3 hectares. Citrus has had an overall increasing trend over the 14 years, having increased by 131.3 hectares since from 427.6 hectares in 2007/08 to 558.9 hectares in 2021/22. Apples and pears have fluctuated in crop area over the survey years, with the lowest 32 hectares in 2016/17 and this year has seen the greatest cropped area in all survey years, covering 140.4 hectares.

Tomatoes have shown the largest decrease in area from 257.1 hectares in 2007/08 to 42.9 hectares in 2021/22. Grapes have declined in area from 574.7 hectares in 2007/08 to 422.5 hectares in 2021/22. The cropped area of squash has fluctuated over the last 14 years, but overall there has been a decline from 306.6 hectares in 2007/08 to 104.4 hectares in 2021/22. Cauliflower and broccoli has also fluctuated over the years, but overall there has been a general increase in cropped area from 10.4 hectares in 2007/08 to 43.2 hectares in 2021/22. The cropped area of persimmon has had an overall increase over the surveyed years, from 40.7 hectares in 2007/08 to 64.6 hectares this year (2021/22).

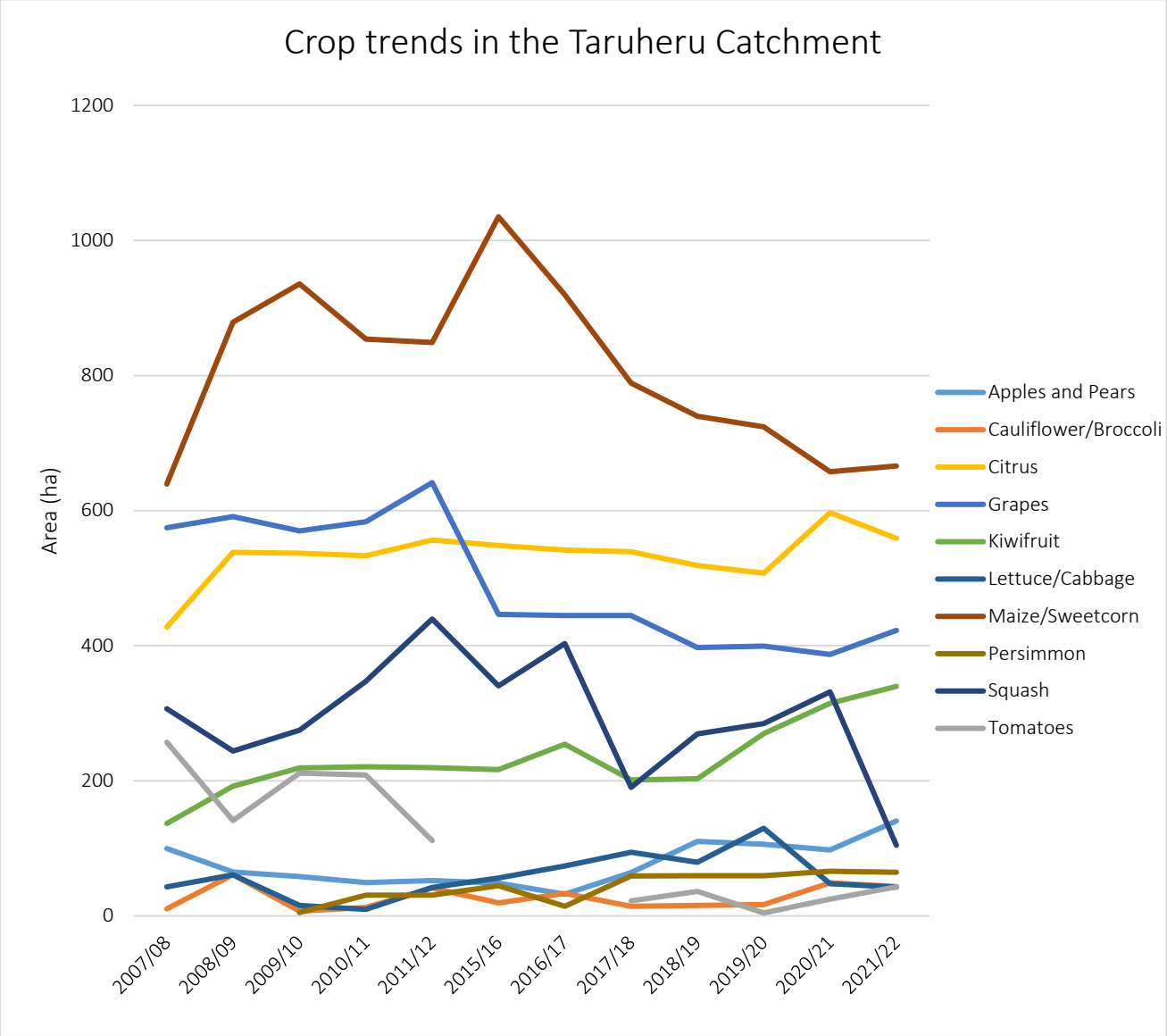

Figure 17. Long Term Crop Trends in the Taruheru Catchment, summer periods from 2007/08 to 2020/21

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. Crops where the water ways were not visible, the "not-visible" category was used and in the comments TBC (to-be-confirmed) was noted.

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 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.

The total area that was classed as having a water threat was 4,978 hectares (712 crops). This comprises 20% of the total area surveyed in the Gisborne region, and 46% of cropped area relevant to having a water threat (not including pasture and permanent crops). Each of the categories are shown in Figures

18 and 29. These included cultivation <5m from the edge of a modified watercourse or stream (Rule 6.2.9(3)/6.2.9(4), cultivation <10m, Rule 6.2.9(2), and <5m from a roadside drain.

Permanent crops i.e. grapes, persimmon, flowers, feijoa, avocados, 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 was difficult to determine when cultivation could 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 as to what rule was not being followed based on the relevant rules for cropping in the Freshwater Chapter C6 of the TRMP.

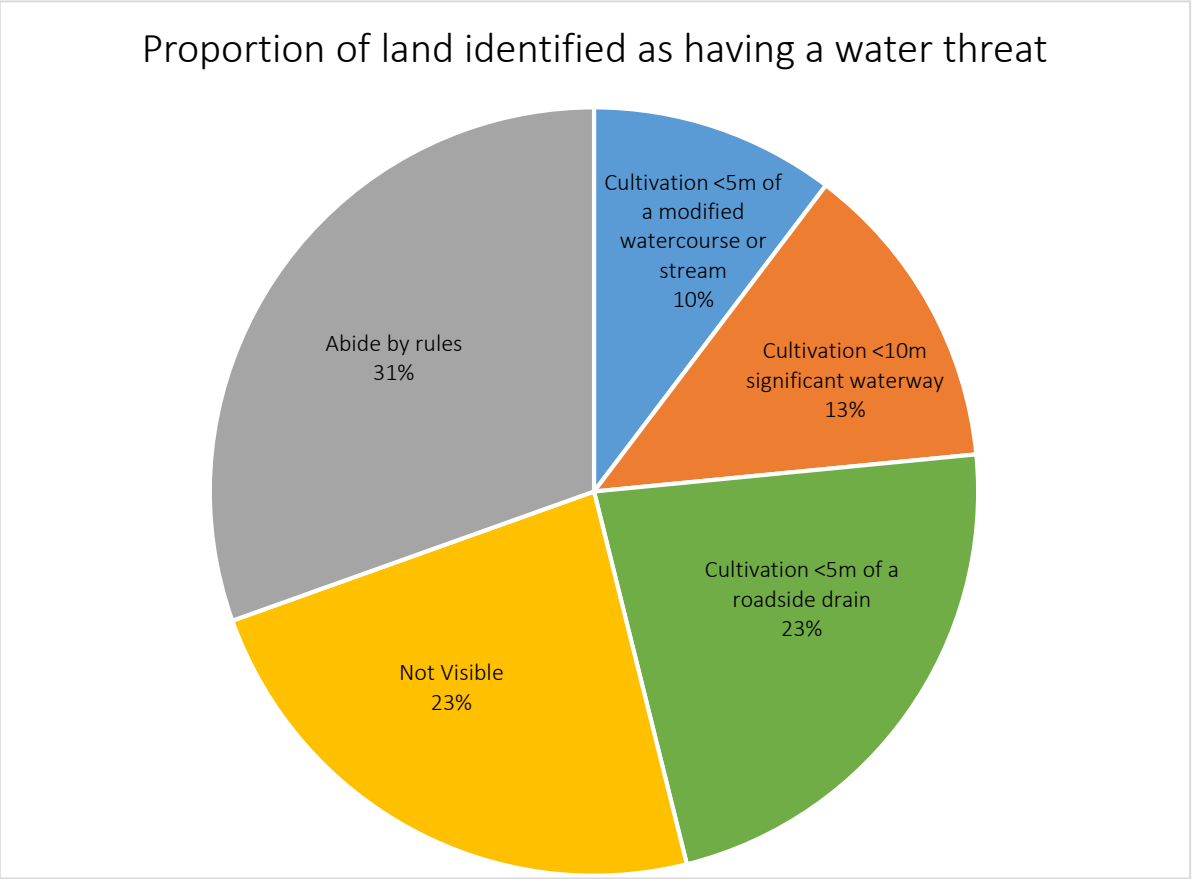

Figure 18. Proportion of land area in hectares (ha) in the Gisborne region triggering rules within the Freshwater Chapter of the Tairāwhiti Resource Management Plan - identified as a water threat.

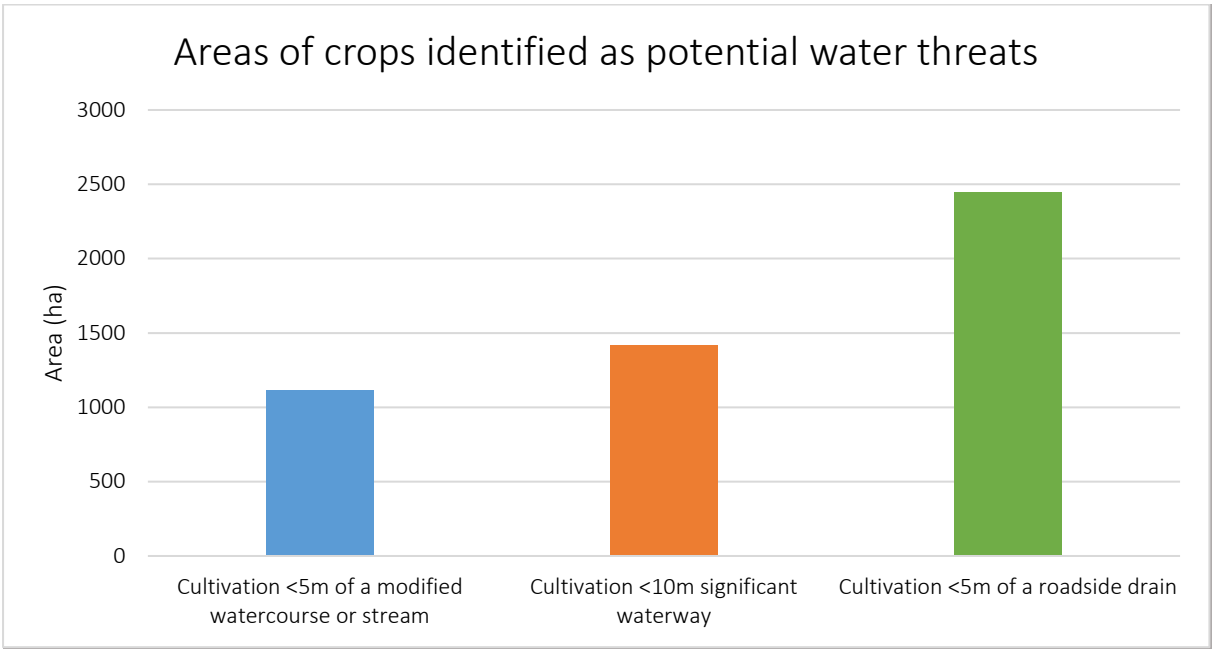

Figure 19. Proportion of land triggering rules within the Freshwater Chapter of the Tairāwhiti Resource Management Plan identified as a water threat.

The 2020/21 Summer Crop Survey showed the most common water threat rules triggered was Rule 6.2.9(4) 'Cultivation <5m edge of a modified watercourse or stream'. The second most common rule triggered was Rule 6.2.9(4) 'Cultivation <10m Permanently Flowing Stream, Regionally Significant Wetland and Aquatic Ecosystem Waterbody', and the third was and Rule 6.2.9(3) 'Cultivation <5m edge of a modified watercourse or stream'. The offence of most importance is Rule 6.2.9(4) 'Cultivation <10m Permanently Flowing Stream, Regionally Significant Wetland and Aquatic Ecosystem Waterbody' as these waterways have been recognised as having high ecological significance to the Gisborne district. 1418 hectares (ha) of commercially cropped area in the Gisborne region was found to breach this rule, see Figure 19.

This year there has been a much larger area of cropped land that does not complying with the new rules in the Freshwater Chapter C6 of the TRMP which were implemented on the 1st of May 2021. The 2020/21 Summer Crop Survey noted 438 hectares as having a water threat, to this years (2021/22) summer crop survey findings of 4,978 hectares being a threat to water. This increase may be due to an improvement in watercourse definitions and threat identifications before this year's survey. The increase is also likely due to relevant setback requirement rules which came into effect on the 1st of May 2021 to reduce water threats from commercial cropping practises which were applied when doing this years summer crop survey.

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.

There were limitations where crops and waterways were not visible from the road. This was due to access restrictions into private properties and to physical barriers like wind breakers, hills and distance blocking the land. The potential for water courses on properties where cropped land or physical barriers were obstructing surveying meant the threat to water ways was not accounted for.

To overcome these limitations, there should be communication with landowners where access and visibility are restricted. Applying remote sensing or using the Council's drone could overcome these limitations, however this would be much more expensive, potentially more time consuming, and permission from landowners would be required. Recent aerial photography could be used to identify new cropped areas, which can be added to the survey using GIS Software.

5.2 Survey Method

As stated in Section 2.0, this was the fourth year that the summer crop survey was done by using a handheld tablet rather than recording on aerial maps. The crop survey was efficient with two people, whereby driving a distance and pulling 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. Two people were necessary in the rural areas which required longer periods of driving between distanced crops. It would be 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. 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 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, so no further work was needed to be completed after the survey.

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 (9,663.6 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 2021/22 Summer Crop Survey began on 11th of January 2022 and finished on the 27th of January, around the same dates as the previous 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 varies the results each year, as only the crops present during the time of the survey are recorded.

6.0 Conclusion

In summary, the 2021/22 Summer Crop Survey covered a total of 24,289.2 hectares. 13,360.5 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 5376.8 hectares, followed by citrus covering 1503.9 hectares, grapes covered 1395.95 hectares, squash covered 970.1 hectares, kiwifruit covered 775.2 hectares and apples and pears covered 567.8 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 identified as a water threat went from approximately 1,473 hectares in 2018/19 to 438 hectares in 2020/21 to now 4,983 hectares in 2021/22. This amounts to 20% of the total land surveyed in the Gisborne region. There has been a large increase in the total area identified as a threat to water, this may due to the rules which came into effect on the 1st of May 2021.

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 2021/2022

Sum of Area (ha)	Locality					
Crop	East Cape/Ruatoria	East/Tolaga/Tokomaru	Motu/Matawai	Poverty Bay Flats	Te Karaka/Whatatutu	Total (ha)
Apples and Pears				515.99590	51.78454	**567.7804**
Avocados				78.64201	0.439483	**79.08149**
Baleage	84.28453	16.63198	92.13731	56.18203		**249.2359**
Cauliflower/Broccoli				58.48151	20.62918	**79.11069**
Chicory	196.0081	95.25827	11.70909	181.72240	49.18756	**533.8854**
Citrus	4.719674	35.79542		1449.65300	13.68438	**1503.852**
Clover		20.03013		48.73274		**68.76287**
Courgettes				60.16458		**60.16458**
Feijoa		10.07755		39.14075		**49.2183**
Flowers				1.95459		**1.954589**
Forage rape	1.039064	11.85053	15.31417	45.46608	20.43527	**94.10511**
Grape Nursery						**0**
Grapes		0.55116		1332.60700	62.79409	**1395.952**
Kiwifruit		16.42533		749.73450	9.082403	**775.2422**
Leafy Turnip	111.0695	33.7861	74.6164	16.40358	17.64886	**253.5244**
Lettuce/Cabbage				43.67768		**43.67768**
Lucerne	145.0901	7.188305	3.153863	117.05340	47.02436	**319.51**
Lupin					1.766581	**1.766581**
Maize/Sweetcorn		1062.154		3602.06200	712.585	**5376.801**
Melons				3.93752		**3.937516**
Not Visible			1.664447	763.17600	500.247	**1265.087**
Olives	2.274749			6.04357		**8.318315**
Other/Unknown	51.14127	124.019		73.76378	27.60201	**276.5261**
Pasture/Unused	1822.231	1401.809	617.8555	3827.86600	1357.329	**9027.091**
Persimmon				94.67290		**94.6729**
Pine Nursery				4.46280	43.0584	**47.5212**
Pinenuts				1.52268		**1.522675**
Plantain	11.16862	36.39421		23.24922		**70.81205**
Plantain/Chicory	54.33207	5.412183		38.09263		**97.83688**
Plantain/Clover	17.57655	20.32663	3.733914			**41.63709**
Pomegranate				0.53455	1.134602	**1.669148**
Poplar/Willow Nursery	0.59025			10.77933		**11.36958**
Potatoes						**0**
Squash		132.5896		553.63810	283.9179	**970.1456**
Stock Feed				31.87765		**31.87765**
Stonefruit				15.18692	5.417438	**20.60436**
Strawberries				0.15333	35.07316	**35.22649**
Tamarillo				6.03408		**6.034077**
To Be Planted		4.127119	10.29796	568.74180	53.32832	**636.4952**
Tomatoes				135.91120	13.0047	**148.9159**
Yarrow	10.00899	10.39276		17.87058		**38.27233**
Grand Total (ha)	**2511.534467**	**3044.819277**	**830.4827**	**14575.1884**	**3327.174**	**24289.2**
Crop Total (ha)	**689.303467**	**1638.883158**	**200.6647**	**9415.40458**	**1416.27**	**13360.53**

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
Apples and Pears	99.5	64.8	58.2	49.3	52	48.3	32	64	110.3	105.9	97.7	140.4
Avocados	18.4	11.4	13.7	29.2	35.2	13.6	16.5	16	20.2	20	33.6	31.7
Baleage									1.8	1.8	7.6	19.8
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
Clover									13.6	10.6	25.6	6.8
Courgettes							1.3	1.4				60.2
Feijoa						9.7	21.7	24.2	24.8	25.4	27.9	18.1
Flowers								0.6	0.6	0.6	0.6	0.6
Fodder Beet									7.8			
Forage rape									19.7			
Grapes	574.7	591.3	569.8	583.7	641.4	446.3	444.6	444.5	397.4	399.4	387	422.5
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
Leafy Turnip							36.9	20.1	39	23	0.7	11.3
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
Lucerne			7.9	27.3		4.6	12.9	7.2	2.9		23	15.7
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
Melons	54.4	4.9	17.8	30.9	18.2	3.1	1.5	31.6	3	0.1	0.8	
Olives						0.4	0.7	1.7	1.3	1.3	1.2	1.2
Onions			1.7									
Other								30.8	15.8	39.1	70.5	10.6
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
Pine Nursery								0.1	0.5	0.5	1.4	1.4
Plantain						27.9	10.8	5.9	5.2			
Plantain/Chicory									0.9	4.8	4.8	3.4
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
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
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
Tomatoes	257.1	141.3	211.2	208.2	111.6			22.3	36.3	4.3	24.6	42.9
Grand Total	**2624.5**	**2823.9**	**2944.1**	**2984.6**	**3141**	**2836.2**	**2867.1**	**2647.6**	**2621.1**	**2716.3**	**2822.6**	**2624.4**

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.*

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, 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.*

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