SUNSHINE YATES CONSULTING I.

Research into FOGO bin use -FOGO bin audits

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EXECUTIVE SUMMARY

This document reports on research commissioned by the Ministry for the Environment (the Ministry) into the use of Food Organics and Garden Organics (FOGO) bins to dispose of food scraps.

The research was undertaken across five South Island council areas, one of which provides households with an 80-litre FOGO bin, while the other four councils provide 240-litre FOGO bins. All five councils provide weekly FOGO bin collections and fortnightly rubbish bin collections.

Similar research was undertaken in 2022 to better understand existing Food Only (FO) collections operated by four North Island councils.

FOGO bins are currently provided by eight councils in the South Island, while nine North Island councils and one South Island council collect food scraps in weekly FO collections. FOGO collections generally appeal to households with gardens, as they provide a disposal opportunity for garden waste and food scraps.

As part of this research, the contents of 1,012 FOGO bins were audited, 708 240-litre FOGO bins and 304 80-litre FOGO bins.

General findings

The audit found that 32% of 240-litre and 23% of 80-litre FOGO bins contained no food scraps. These bins were used to dispose of garden waste only.

Of the FOGO bins that did contain food scraps, there were on average 2.48 kg of food scraps in the 240-litre bins and 2.86 kg in the 80-litre bins. Across all FOGO bins (with and without food scraps), the average weight of food scraps in 240-litre bins was 1.68 kg and in 80-litre bins it was 2.25 kg. The research did not gather data on the proportion of households that do not set out their FOGO bin.

While councils with FO collections can directly monitor the amount of food scraps diverted, based on the tonnes of material collected, councils with FOGO collections do not have access to the tonnage of food scraps collected, as these are combined with the garden waste.

The research found in the four council areas with 240-litre FOGO bins, that on average 13.1% of the material in the FOGO bins, by weight, was food scraps (this varied from 9.8% to 20.3% across the four councils). The 80-litre FOGO bins contained on average 29.6% of food scraps. There was more variation in the amount of garden waste than food scraps, impacting on the % of each material in the bin.

More households are using their FOGO bins for garden waste than for food scraps, with only 10% of 240-litre and 20% of 80-litre FOGO bins containing no garden waste.



A survey was distributed to all households that had their FOGO bin collected. Twenty-nine per cent of households in the FOGO bin audit completed the survey. The survey responses show that 78% of households that use their FOGO bin to dispose of food scraps set them out weekly, and 17% set them out fortnightly. Households that set them out fortnightly set out more food scraps each time than households that set them out weekly, but they set out less food scraps overall than households that set their FOGO bins out weekly.

The less frequently a household sets out their FOGO bin, the more likely they are to not have food scraps in their FOGO bin.

Households that reported placing their food scraps directly into their FOGO bin (without using a food waste caddy or kitchen container) set out less food scraps in their FOGO bin, and were more likely to not set out any food scraps.

Households with children (0-20 years old) were more likely to place food scraps into their FOGO bin, and set out more food scraps per residents than other households.

The results for the 80-litre and 240-litre FOGO bins are presented separately throughout this report. As there is only one council with 80-litre FOGO bins, it is not possible to say whether the difference between the 240- and 80-litre bin results are caused by the bin size, or other factors. There may be several other factors that contribute to the differences, such as how long the services have been available, communications provided to the public, and differences in geography, housing types, and economics in the different areas.

Comparison with FO bins

The methodology used for the FO research and the FOGO research do not allow for direct comparisons to be made between the two food scraps collection systems.

A metric that would be of value in making a comparison would be the relative quantities of food scraps, per serviced household, collected by each type of collection. Comparing this metric for the two types of collections is complicated by the lack of information on the seasonal variation in the quantity of food scraps in FOGO collections. Although councils have data on seasonal variations in overall tonnages of FOGO collections, the variation in the proportion of food scraps compared to garden waste has not been studied.

It can, however, be assumed that food scraps are likely to be less seasonally variable than garden waste.

Councils included in the FO and FOGO research were asked to provide data on the monthly tonnage of material collected and the number of households that have access to the service, in the month the audit was undertaken for each research project. The results of this analysis are shown below.



Councils included in 2022 and 2024 food scraps research	Average weight per household of food scraps set out per month
Council 1 – FO (November 2022 data)	5.0 kg
Council 2 – FO (November 2022 data)	3.7 kg
Council 3 – FO (November 2022 data)	3.6 kg
Council 4 – FO (November 2022 data)	2.1 kg
Council A – FOGO (April 2024 data)	2.8 kg
Council B – FOGO (May 2024 data)	1.3 kg
Council C – FOGO (May 2024 data)	6.2 kg
Council D – FOGO (April 2024 data)	4.5 kg
Council E – FOGO (May 2024 data)	7.2 kg

Comparison of average monthly household set out of food scraps, FO and FOGO

Councils with FO collections are collecting between 2.1 kg and 5.0 kg per month of food scraps per household (average across all properties with access to the collection service), while councils with FOGO collections are collecting between 1.3 kg and 7.2 kg per month of food scraps per household.

One FO council and one FOGO council have high levels of seasonally occupied dwellings and short-term rentals (Council 4 and Council B). These councils have lower average weights of food scraps set out, as fewer households are likely to be using the services during the timeframes of the research.

Data from other research shows that there are similar levels of contamination across the two systems, when factoring in garden waste contamination. FO bins are shown to have between 1.7% and 4.8% contamination, while FOGO bins have between 5.2% and 7.4% contamination (including garden waste contamination). Removing the garden waste contamination from the FOGO bins results in average contamination levels of 3.4% in 240-litre FOGO bins and 4.2% in 80-litre FOGO bins.

Ultimately, councils considering whether to implement a FO or a FOGO collection will want to consider whether they have processing capacity for both food scraps and garden waste combined, and whether they want to collect garden waste that may already be being collected from many households through private garden waste collections.



Opportunities for further research

Differences in the use of 80-litre and 240-litre FOGO bins warrants further research, to determine whether bin size, or other factors, results in households with 80-litre FOGO bins setting out more food scraps.

It is understood that data on FOGO collections are available through council contractors' reporting to councils. This generally includes weekly tonnages of materials collected and the number of households from which material was collected.

This data can be used alongside the average weight of food scraps and of contamination per bin, from this research, to determine an approximate tonnage of food scraps collected. This does not, however, assist in measuring variations in food scraps set out over time. There is no obvious method to determine the proportion of food scraps in FOGO bins, other than through bin audits.

The use of Solid Waste Analysis Protocol (SWAP) audits of domestic kerbside rubbish provides information on the amount of food scraps being disposed of to the rubbish. If the quantity is lower than in previous audits, then it is likely that food scraps are being disposed of in a different manner – most likely to the FOGO bin – but also possibly to the compost or insink disposal unit, or food scraps may have been reduced by the household.

One data set that is not included in this research, and that councils do not generally have access to, is the FOGO bin participation rate. While a council may have data on the number of households that set out their FOGO bin each week, they do not know whether these are the same households, or different households each week. It may be that 40% of households set out their bin every week, and 60% never set out their bin, or it may be that 80% of households set out their bin fortnightly, half on one week, and the other half the next week, and only 20% of households never set out their bin.

A month-long participation survey can provide data on the number of times a month households use each of their kerbside bins. However, it is also possible that this data could be gathered from collection contractor GPS equipment.

1. INTRODUCTION

This document reports on research undertaken into the use of Food Organics and Garden Organics (FOGO) bins to dispose of food scraps in five South Island council areas.

In 2023, the Ministry commissioned research into how households use their council provided FOGO collections to dispose of food scraps in five South Island council areas. The five councils included in this research are:

- Central Otago District
- Waimate District
- Timaru District
- Mackenzie District
- Christchurch City

There were three distinct, but overlapping, outcomes to this FOGO research:

- 1. Measuring household food scraps collected in FOGO kerbside services through audits of over 1,000 household FOGO bins in five local council areas
- 2. Understanding household usage of FOGO collections through a survey delivered to households in those same areas
- 3. Understanding people's views on FOGO collections and benchtop food scraps caddies through a series of focus groups with residents in the same FOGO areas

This report, prepared by Sunshine Yates Consulting Limited (SYCL) includes the methodology and results of the first outcome of the research, including:

- Measuring household food scraps collected in FOGO kerbside services (via bin audits)
- Analysis of bin audit results and survey responses for those households that completed a survey and had their FOGO bin audited
- Comparison of results of food scraps and FOGO audit results

The findings from the survey (for all respondents) and the focus groups are presented in a separate report by AK Research, entitled: *Research into FOGO bin use - Short-form survey and focus group findings*¹.

This research builds on research undertaken in 2022 to better understand Food only (FO) collections operated by four North Island councils. The outcomes of the 2022 research are

¹ <u>https://environment.govt.nz/publications/fogo-research-short-form-survey-and-focus-group-findings</u>



available in two reports: Research into barriers to use of Food Scraps Collections² and Food Scrap Collection Service Qualitative Research³.

2. BACKGROUND

2.1 FOGO collections

FOGO collections are currently one of the two types of food scraps collections used in Aotearoa New Zealand. FOGO collections allow householders to dispose of both their garden waste and their food scraps into the same bin, which is generally collected weekly.

This service is largely popular with households with gardens, as it provides a (usually rates funded) service to collect reasonably large amounts of garden waste. However, not all households that use a FOGO bin for garden waste also dispose of their food scraps to the FOGO bin.

Collecting food scraps in a FOGO bin, instead of a food only bin, can reduce odour, due to the increased aeration of food scraps when mixed with garden waste. However, collecting food scraps in a FOGO bn means that the council also has to collect the garden waste, which householders were previously responsible for. In more urban areas, ratepayers without gardens may object to subsidising the disposal of garden waste from households that do have gardens.

2.2 Councils with food scraps and FOGO collections

Currently ten councils provide a food only collection to their urban residents, and eight councils provide a FOGO collection. All of the FOGO collections are in the South Island, and all bar one of the food scraps collections are in the North Island (Kaikōura District Council being the exception).

Type of collection	Territorial authority	
Food scraps	Auckland Council	
collections	Hamilton City Council	
	Hauraki District Council	
	Kaikōura District Council	
	Matamata-Piako District Council	

Table 2.1 - Councils with Food scraps o	r FOGO collections, August 2024
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² https://environment.govt.nz/assets/publications/Waste/Research-into-barriers-to-use-of-foodscraps-collections.pdf

³ https://environment.govt.nz/assets/publications/Waste/Food-scrap-collection-servicequalitative-research-summary-report.pdf

Type of collection	Territorial authority	
	New Plymouth District Council	
	Ruapehu District Council	
	Tauranga City Council	
	Thames-Coromandel District Council	
	Western Bay of Plenty District Council	
FOGO collections	Central Otago District Council	
	Christchurch City Council	
	Dunedin City Council	
	Mackenzie District Council	
	Selwyn District Council	
	Timaru District Council	
	Waimakariri District Council	
	Waimate District Council	

2.3 Standardisation of kerbside collections

In September 2023, the Ministry published new requirements for Territorial Authorities (TAs) to standardise the materials they accept at kerbside. These requirements were published in the New Zealand Gazette as 'Standard Materials for Kerbside Collections Notice 2023 (Notice No. 1)'⁴, and included materials collected in kerbside recycling collections, food scrap collections and FOGO collections. The Gazette Notice required materials to be standardised by 1 February 2024. The following information on standardisation of food scraps and FOGO collections was published in the Gazette Notice.

Accepted Materials

The following materials are to be accepted:

- Food organics accepted materials: food organics only
- FOGO accepted materials: food organics and garden organics only.

To meet the performance standard, Territorial Authorities must clearly list the accepted materials in public communications (website pages, brochures, social media posts, etc) about the Services affected by this notice.

Excluded Materials

For clarity, the following materials must not be accepted:

⁴ https://gazette.govt.nz/notice/id/2023-go4222

- SUNSHINE YATES
 - Food organics and FOGO excluded materials: paper and cardboard; compostable packaging; tea bags; sawdust from treated timber; animal waste; and ash.

Discretionary Materials

Territorial Authorities have discretion to specify whether they accept the following materials:

- Food organics discretionary materials: compostable plastic bin liners or compostable fibre (paper, cardboard or other types of biomass) bin liners; seashells; and small amounts of garden organics
- FOGO discretionary materials: compostable plastic bin liners or compostable fibre (paper, cardboard or other types of biomass) bin liners; seashells; fibrous or woody plants; noxious weeds; and garden material likely to contain chemical spray residues.

2.4 Councils included in this research

The Ministry selected the five councils to be included in this research. All five councils currently provide a weekly FOGO collection to their urban households. These collections have been operating for varying lengths of time. Timaru had one of the first FOGO collections in the county, implemented in 2006, while Central Otago launched their FOGO collection in July 2023. Launch dates are provided in Table 2.2.

Table 2.2 - Launch date o	of each FOGO collection
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Central Otago	Waimate	Timaru	Mackenzie	Christchurch
July 2023	July 2021	July 2006	March 2022	March 2009

Each of the councils publish information on their websites and on social media to communicate which materials are accepted, and not accepted, in the FOGO bins. A brief review of the information on their websites found variability in the discretionary materials each council listed as acceptable and unacceptable.

Overall, the key materials that the councils communicate that they accept in their FOGO bins are as listed in Table 2.3.

Materials accepted in FOGO bins	Central Otago⁵	Waimate ⁶	Timaru ⁷	Mackenzie ⁸	Christchurch ⁹
Food scraps -	Food scraps	Food scraps	Food scraps	Food scraps	Food scraps
accepted	Small bones			Bones	Bones
					Shells and shellfish
Other	Garden waste	Garden waste	Garden waste	Garden waste	Garden waste
materials accepted	Newspaper for lining bins				

Table 2.3 – Materials accepted in FOGO bin by each council

The main differences between the FOGO collections in these five council areas include:

- Christchurch City Council provides 80-litre wheelie bins for their FOGO collection, while the other councils all provide 240-litre wheelie bins. All services are weekly.
- Central Otago District Council provides households with a bench top caddy to collect food scraps in the kitchen. Central Otago also allows householders to use newspaper to wrap food or line their food caddy. The other councils do not allow any paper in FOGO bins.
- Only Christchurch City Council specifies that they accept shells and shellfish, while Mackenzie District Council state that they do not accept shells and shellfish. No mention of shells and shellfish could be found in the other councils' online communications.
- Three of the councils specify that bones are accepted, and two don't appear to mention bones.

⁵https://issuu.com/centralotagodistrictcouncil/docs/new_bins_booklet_a5_- april_2023_-_14mg?fr=xKAE9_zU1NQ

⁶https://www.waimatedc.govt.nz/repository/libraries/id:21r92ideo17q9sg7je9s/hierarchy/Documents/ Environment%20%26%20Waste/Recycling%20and%20Resource%20Recovery/Waimate%20DC%20k erbside%20rubbish%20and%20recycling%20guide%20Feb%202024

⁷ <u>https://www.timaru.govt.nz/services/environment/waste-minimisation/organics-green-bin</u>

⁸ https://www.mackenzie.govt.nz/services/rubbish-and-recycling/bin-collections

⁹ <u>https://ccc.govt.nz/services/rubbish-and-recycling/greenbin/</u>

3. FOGO BIN AUDIT METHODOLOGY

The FOGO bin audits were undertaken in April and May 2024 by Whirika Consulting, subcontracting to SYCL. SYCL designed the collection and audit methodology and attended the first two days of auditing in Central Otago to assist Whirika Consulting with the audit set up and to ensure that the methodology was appropriate and feasible.

Garden waste is seasonal, and the quantity, and types, of garden waste set out at different times of the year vary according to the seasons. All auditing was undertaken in late autumn in April and May 2024.

The weather in the week preceding a FOGO bin collection can also affect the amount of garden waste disposed of to a FOGO bin, as it can encourage, or hinder, gardening activities.

Food scraps are also affected by seasonal differences, due to the different foods available and consumed at different times of the year. However, the quantity of food scraps is likely to be less affected by seasonality than garden waste.

All results in this report are late autumn results, and not necessarily representative of garden waste or food scraps disposal at other times of the year.

3.1 Sample numbers

Table 3.1 provides an overview of the number of FOGO bins sampled in each council area and the dates within which the auditing was undertaken. In total 1,012 FOGO bins were audited over 18 days. The audit aimed to include at least 150 FOGO bins from the two smaller council areas (Waimate and Mackenzie), at least 200 FOGO bins from the larger council areas of Central Otago and Timaru, and 300 from Christchurch City.

Council areas	# of FOGO bins audited	Audit dates
Central Otago District	203	8-11 April
Waimate District	150	16-18 April
Timaru District	203	6-9 May
Mackenzie District	152	10, 13 & 14 May
Christchurch City	304	20-23 May
TOTAL	1,012	-

Each council assisted by providing maps of areas to collect the FOGO bin samples from, including a range of streets on each collection day that broadly covered the demographics of

the district or city. Each council liaised with their FOGO collection contractors to ensure that the content of the bins were not collected before the audit team was able to access them.

3.2 Collection methodology

The sample collection was undertaken in the morning of the day of the households' usual FOGO collection. The collection was undertaken by a team of three in a box truck, including a driver and two collection crew. The driver would drive the team to the first street on the map provided by the council and stop outside a house with a FOGO bin set out. The collection crew placed a survey into the household's letterbox, and then emptied their FOGO bin into a large plastic bag. The bag was closed with a cable tie and a unique ID number was affixed to the bag. The truck driver recorded the household address and the associated unique ID. The team then moved onto the next household.

Each morning the collection crew collected the contents of at least 50 FOGO bins (or at least 70 in Christchurch where the bins are smaller), from at least five streets recommended by council. The FOGO bins were selected randomly from the side of each street that the collection truck was driving down. Once the sample had been collected, the collection crew drove to the audit site (generally a transfer station) and unloaded the bags of FOGO materials, which were audited on the same day.



Sample of bags of FOGO materials before auditing

3.3 Audit methodology

Auditing in each council area was undertaken in a location provided by the Council. Each audit location included an under cover area where the audit could be carried out away from heavy machinery and other activities. Each Council provided bins for the disposal of the materials after the audit – one bin for garden and food waste and another for contamination.

The audit team included a Whirika Consulting supervisor and three contract auditors. Whirika Consulting provided all auditing equipment, including a sorting table, labelled bins, calibrated electronic scales, and all PPE.



The audit sorted each household's FOGO bin individually. A bag containing the contents of a FOGO bin was selected, weighed in, and the unique ID recorded. The bag was then placed onto the sorting table and emptied. The materials were sorted into the nine categories outlined in Table 3.2.

Audit categories	Category description
Food scraps	All food scraps, excluding tea bags. Includes fruit, vegetables, meat and bones, seafood, cooked food, raw food, avoidable and non-avoidable food scraps.
Garden waste	All garden waste, such as lawn clippings, leaves, small branches, weeds, spoiled fruit and vegetables direct from garden. Excluded flax, cabbage tree leaves, bamboo, palm leaves, rhubarb leaves, soil and rocks.
Compostable bin liners	Biodegradable or compostable bin liners, paper used to line bin or wrap food
Compostable packaging	Paper or plastic packaging labelled as being 'compostable'
All other paper	All other paper (newspapers, tissues, take away paper packaging etc)
Food in packaging	Food in its original packaging (e.g. tea bags, pot of humus, box of cereal etc)
Items in plastic bags	Food, or other items (including animal faeces) in non- compostable plastic bags
Garden waste contamination	Flax, cabbage tree leaves, bamboo, palm leaves, rhubarb leaves, soil and rocks
All other contamination	All other materials - including animal faeces not in a plastic bag, animal faeces in compostable bags, animal carcasses, ash, plant pots, and all other materials

Table 3.2 – Audit categories and definitions

As materials were sorted, they were placed into bins labelled with the material categories.





Audit table and labelled bins

The food scraps were generally left on the table until all other materials had been removed. A checklist was then used to identify the main types of food scraps present (e.g. fresh fruit and vegetables, meat, homemade food etc.). The different types of food scraps were not weighed separately. Once their presence in the sample had been recorded, then all food scraps were amalgamated into the food scraps bin and all of the bins of material were weighed out and their weights recorded.



Example of food scraps from FOGO bin

The food types identified at this stage were classified according to the food groups used in previous Love Food Hate Waste¹⁰ research, as shown in Table 3.3.

¹⁰ Sunshine Yates Consulting, 2018, New Zealand Food Waste Audits, WasteMINZ



Food groups	Description
Bakery	All bakery items, including bread, pastries, pies, scones etc.
Condiments	Includes condiments, sauces, herbs and spices, including garlic and ginger, dried and fresh herbs, seasoning sachets, jams, honey, salad dressing etc.
Dairy	All dairy products, including eggs. Includes cheeses, milk, yogurt etc.
Desserts	All cakes, puddings, ice cream etc. Does not include bakery type pastries.
Drinks	Tea bags, coffee grinds and granules, milkshakes, fruit juice, water, alcohol etc.
Fats	Oils, butter, margarine, lard.
Fresh fruits	All fresh fruit, including fresh fruit that has been cooked fruit, and excluding dried, canned or frozen fruit.
Fresh vegetables	All fresh vegetables, including fresh vegetables that have been cooked, and excluding canned or frozen vegetables,
Homemade food	All home prepared mixed foods, cooked or raw, including leftovers, homemade sandwiches, instant noodles, stews and soups.
Meat and fish	All meat and fish that are not included in a meal (which would then be categorised as homemade food). Includes shell fish, canned fish, bones etc.
Pre-prepared meals	All types of take away meals and snacks, including fish and chips, Indian and Chinese take away meals, coleslaw salads from take away restaurants, burgers, pizzas etc.
Processed fruit	Dried, canned or frozen fruits, when they can be identified as such, and is not included as an ingredient in another food.
Processed vegetables	Canned or frozen vegetables, when they can be identified as such, and is not included as an ingredient in another food.
Snack foods	Snack foods including sweets, biscuits, chocolate, nuts, crackers and chippies etc.
Staple foods	Rice and pasta, dry and cooked (but not included with other ingredients), cereals, flour etc.
Other	The other category includes unidentifiable food (categorised as Gunge), pet food, and baby food.

Table 3.3 – Food groups from Love Food Hate Waste research

On each of the 18 days of the FOGO audit, an additional analysis was undertaken on the contents of the first ten FOGO bins that contained food scraps. The contents of each of these



FOGO bins was emptied onto the sorting table, and sorted as per all other samples. However, the food scraps were left on the table after all other materials had been removed, and were further sorted into avoidable and non-avoidable food scraps. This sort was based on the same methodology used in the Love Food Hate Waste research, where food scraps were separated into avoidable, potentially avoidable and non-avoidable.

The definitions used in the Love Food Hate Waste research are provided below:

- 'Avoidable' food waste was food that could have been eaten at some point in time. It did not take into account the current state of the item (which could be mouldy, or past its 'best before' date), but considered, instead, its past potential. The whole item was included, even if part of it was unavoidable (i.e. the skin on a whole banana).
- 'Potentially avoidable' food waste was food that some people eat, and others don't (e.g. apple and potato peels). This category also ignored the current state of the item (which could be mouldy, or past its 'best before' date).
- 'Non-avoidable' food waste was food that was unlikely to be eaten by the majority of the population, such as banana skins, tea bags, and egg shells.

In this research, the potentially avoidable food was classified as non-avoidable.

3.4 Survey methodology

A survey was developed to provide attitudinal feedback on FOGO bin use by householders in each council area. The survey was developed by AK Research, with input from SYCL, the Ministry and the five councils.

The survey was distributed to 3,000 households across the five councils during the project. A survey was placed in the letterbox of every household that had the contents of their FOGO bin collected, and to twice as many households that did not have their FOGO bin sampled. The survey delivery to households included in the FOGO bin audit was undertaken at the same time as the bins were being emptied. In most council areas the delivery of the other surveys was undertaken by the fourth member of the audit team, while the other three members were doing the bin collection. This contractor would drive to preselected streets near the sample collection area and deliver the survey to the letterboxes of households on those streets, regardless of whether they had set out a FOGO bin. This ensured that a sample of households that did not use their FOGO bin was likely to be included. The overall sample of households is expected to be skewed towards households that use their FOGO bin, as 50 of the 150 surveys distributed each day were to households that had set out their FOGO bin (in Christchurch surveys were distributed to 210 households per day).



Each householder had the option to complete the paper survey and return it in the prepaid envelope provided, or to complete it online, either by entering a provided web address or by scanning a QR code. A copy of the paper survey is available in Appendix A.

Each survey was accompanied by a letter from their local council, on council letterhead, introducing the survey and its purpose and inviting participation. A prize draw of ten \$100 gift cards was also highlighted in the letter to encourage participation. An example of an introductory letter is available in Appendix B.

The results of the survey are presented in a report by AK Research¹¹. The results of the survey for the households that also had their bin audited are presented in this report in Section 4.9. Only survey questions where there is value in providing a comparison to the results of the FOGO bin audit data are presented in this section.

¹¹ <u>Research into FOGO bin use - Short-form survey and focus group findings.</u>

4. FOGO BIN AUDIT RESULTS

A total of 1,012 bins of FOGO materials were audited during the 18 days of auditing, weighing in total over 11.3 tonnes. The results of these audits are presented in this section, by council area and for all 240-litre FOGO bins combined, and all 80-litre FOGO bins combined. Only Christchurch, with 80-litre FOGO bins, is identified, with their permission, in the results. The other council areas are referred to as councils A, B, C and D, and all use 240-litre FOGO bins. Christchurch is identified as council E.

During the collection of materials from FOGO bins, a small number of FOGO bins were too heavy to be emptied into a plastic bag (some weighed over 60 kg). Therefore, the heaviest bins were not sampled for logistic and health and safety reasons. This will have had a small impact on the average FOGO bin weight within each council area and overall.

Photos of examples of the different types of materials found in FOGO bins are provided in Appendix D.

4.1 Composition of materials in FOGO bins

Table 4.1 provides an overview of the proportion of the weight of the contents of each FOGO bin that is comprised of food scraps, garden waste, and contamination. This data is provided for each of the five councils separately. The average amount of material for all 240-litre FOGO bins combined is also provided.

Material types in FOGO bins, as %		240-lit	80-litre bins	Average 240-litre		
by weight	Council A	Council B	Council C	Council D	Council E	bins
Food scraps	9.8%	11.2%	20.3%	12.4%	29.6%	13.1%
Garden waste	85.4%	82.4%	71.7%	85.1%	62.9%	81.7%
Contamination	4.8%	6.4%	8.0%	2.5%	7.4%	5.2%
All material in average FOGO bin	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Table 4.1 – Food scraps, garden waste and contamination in FOGO bins,proportion by weight

The large variation in the proportion of food scraps shown in Table 4.1 (from 9.8% to 29.6%) is due mostly to the variations in the amount of garden waste in FOGO bins in each council area, as shown in Table 4.2, where the weight of materials is provided.

Material types in		240-lit	80-litre bins	Average 240-litre		
FOGO bins, in kg	Council A	Council B	Council C	Council D	Council E	bins
Food scraps	1.33 kg	1.40 kg	2.01 kg	2.01 kg	2.25 kg	1.68 kg
Garden waste	11.60 kg	10.29 kg	7.11 kg	13.77 kg	4.79 kg	10.49 kg
Contamination	0.66 kg	0.80 kg	0.79 kg	0.40 kg	0.57 kg	0.67 kg
Average FOGO bin weight	13.59 kg	12.48 kg	9.92 kg	16.18 kg	7.61 kg	12.85 kg

Table 4.2 – Food scraps, garden waste and contamination in FOGO bins,average weight per bin

The average weight of food scraps collected per 240-litre FOGO bin varies across the four councils, with food scraps weighing between 1.33 kg and 2.01 kg per set out. The average weight across all 240-litre bins, was 1.68 kg per set out. The average weight of food scraps per 80-litre FOGO bin was 2.25 kg. This amounts to 34% more food scraps, by weight, than in the 240-litre bins. However, as only one council with 80-litre FOGO bins is included in the study, it is not possible to say whether the use of an 80-litre FOGO bin is the causal factor in the higher food scraps capture.

Margins of error for the composition of 80-litre FOGO bins and 240-litre FOGO bins are provided in Appendix C.

4.2 Proportion of bins containing each material

Table 4.3 shows the proportion of FOGO bins in each council area that contained food scraps, garden waste and any type of contamination. This table shows that 90% of 240-litre FOGO bins contained garden waste and 68% of these bins contained food scraps. Almost as many bins contained some type of contamination (64%).

Eighty per cent of 80-litre FOGO bins contained garden waste, 79% of them contained food scraps, and 62% contained some type of contamination. More information on the types of contamination is provided in Section 4.8.

Proportion of FOGO bins		240-lit	80-litre bins	Average 240-litre			
containing each material type	Council A	Council B	Council C	Council D	Council E	bins	
Food scraps	64%	61%	76%	72%	79%	68%	
Garden waste	91%	92%	85%	93%	80%	90%	
Contamination	46%	66%	74%	55%	62%	64%	

 Table 4.3 – Proportion of FOGO bins containing each material type

4.3 Distribution of food scraps weights

The quantity of food scraps per FOGO bin varied substantially. Figure 4.1 provides an overview of the distribution of the food scraps weights across all 240-litre FOGO bins sampled. The median weight of food scraps across all 240-litre FOGO bins is 0.94 kg.



Figure 4.1 – Distribution of weight of food scraps across all 240-litre FOGO bins

Thirty-two per cent of 240-litre FOGO bins contained no food scraps, and 23% contained some food scraps, but less than 1 kg. Twenty-six per cent contained 1 to 3 kg of food scraps and 19% contained more than 3 kg.

Figure 4.2 provides an overview of the distribution of the food scraps weights across all 80litre FOGO bins sampled. The median weight of food scraps across all 80-litre FOGO bins is 1.32 kg.







Twenty-one per cent of 80-litre FOGO bins contained no food scraps, and 20% contained some food scraps, but less than 1 kg. Thirty-three per cent of bins contained 1 to 3 kg of food scraps and 27% contained more than 3 kg of food scraps.

4.4 Average weight of food scraps, when food scraps are set out

The weights provided in Table 4.2 are for all bins included in the audit (by council and for all 240-litre bins combined). However, a large proportion of bins did not contain any food scraps (28% overall). Table 4.4 provides the average weight of food scraps per household when a household disposes of food scraps to their FOGO bin. The average amount of food scraps set out by households with 240-litre FOGO bins is also presented.

Weight of food scraps in		240-lit	80-litre bins	Average		
bins with food scraps, kg	Council A	Council B	Council C	Council D	Council E	bins
% of households with food scraps in FOGO bin	64%	61%	76%	72%	79%	68%
Average weight of food scraps in bins with food scraps	2.09 kg	2.31 kg	2.64 kg	2.79 kg	2.86 kg	2.48 kg
Average % of food scraps, by weight, in bins with food scraps	17.6%	20.8%	28.3%	18.0%	37.7%	21.1%
Average FOGO bin weight for bins with food scraps	11.90 kg	11.13 kg	9.34 kg	15.47 kg	7.59 kg	11.77 kg

Table 4.4 – Food scraps in FOGO bins that contain food scraps, by weight

On average, households with 240-litre FOGO bins, that put food scraps in their FOGO bin, disposed of 2.48 kg of food scraps per set out. This is 21.1% of the material in their bin. Households in Christchurch (with 80-litre bins) set out on average 2.86 kg of food scraps, or 37.7% of the material in their FOGO bin.

Based on the results of the audit, the average weight of FOGO bins containing food scraps is slightly lower than the average weight of FOGO bins that do not contain food scraps.

4.5 Types of food scraps

The audit recorded the types of food scraps disposed of. The different types of food scraps were not weighed individually, instead their presence in a FOGO bin was recorded. Table 4.4 shows the proportion of 240- and 80-litre FOGO bins, that included food scraps, that contained each type of food scrap. The food scraps types are based on food groups used in



previous Love Food Hate Waste¹² research, and are outlined in Section 3.3. The results are presented from the food type that was most frequently present in FOGO bins, to the least frequently present, for 240-litre and 80-litre FOGO bins separately.

In 240-litre FOGO bins, 'Fresh vegetables' were the most common type of food scraps, while in 80-litre FOGO bins 'Fresh fruits' were more common.

About half of FOGO bins contained 'Dairy' products (this category includes eggs), and just under half of the bins contained 'Meat and fish'.

Types of food	% of 240-litre FOGO bins with food scraps, containing each food type	Types of food	% of 80-litre FOGO bins with food scraps, containing each food type
Fresh vegetables	87%	Fresh fruits	88%
Fresh fruits	75%	Fresh vegetables	87%
Dairy	49%	Dairy	53%
Meat and fish	46%	Bakery	49%
Bakery	40%	Meat and fish	46%
Homemade food	29%	Homemade food	38%
Drinks	14%	Pre-prepared meals	17%
Pre-prepared meals	14%	Staple foods	17%
Fats	11%	Drinks	15%
Snack foods	11%	Fats	13%
Other	10%	Snack foods	9%
Staple foods	9%	Condiments	8%
Processed vegetables	4%	Other	5%
Condiments	3%	Desserts	2%
Desserts	1%	Processed fruit	0%
Processed fruit	1%	Processed vegetables	0%

Table 4.5 – Types of food scraps in FOGO bins

¹² Sunshine Yates Consulting, 2018, New Zealand Food Waste Audits, WasteMINZ

4.6 Avoidable and non-avoidable food scraps

Food scraps from a small proportion of FOGO bins (180) were analysed to determine the proportion of avoidable and non-avoidable food scraps they contained (see Section 3.3 for the methodology and definitions).

The break-down of the two types of food scraps by council area is presented in Table 4.6.

Proportion of avoidable and non-		240-lit	80-litre bins	Average 240-litre		
avoidable food scraps	Council A	Council B	Council C	Council D	Council E	bins
Avoidable food scraps	57%	43%	44%	41%	44%	46%
Non-avoidable food scraps	43%	57%	56%	59%	56%	54%

Table 4.6 - Proportion of avoidable and non-avoidable food scraps in FOGO bins

Based on the 180 FOGO bins for which avoidable and non-avoidable food scraps were separated, 44% of the food scraps in 80-litre FOGO bins and 46% in the 240-litre FOGO bins were classified as avoidable, while 56% of the food scraps in the 80-litre FOGO bins and 54% in the 240-litre FOGO bins was classified as non-avoidable.

4.7 Distribution of garden waste weights

The quantity of garden waste per FOGO bin varied substantially. Figure 4.3 provides an overview of the distribution of the garden waste weights across all 240-litre FOGO bins sampled. The median weight of garden waste across all 240-litre FOGO bins was 8.64 kg.



Figure 4.3 – Distribution of weight of garden waste across all 240-litre FOGO bins

Ten per cent of 240-litre FOGO bins contained no garden waste, and 55% contained less than 10 kg.

Figure 4.4 provides an overview of the distribution of the garden waste weights across all 80litre FOGO bins sampled. The median weight of garden waste across all 80-litre FOGO bins was 3.64 kg.



Figure 4.4 – Distribution of weight of garden waste across all 80-litre FOGO bins

Twenty per cent of 80-litre FOGO bins contained no garden waste, and 76% contained less than 10 kg.

4.8 Contamination in FOGO bins

Seven categories were created to capture the different types of contamination present in FOGO bins. These are listed and described in Table 4.7.

Contamination categories	Category description
Compostable bin liners	Biodegradable or compostable bin liners, paper used to line bin or wrap food
Compostable packaging	Paper or plastic packaging labelled as being 'compostable'
All other paper	All other paper (newspapers, tissues, take away paper packaging etc)
Food in packaging	Food in its original packaging (e.g. tea bags, pot of humus, box of cereal etc)
Items in plastic bags	Food, or other items (including animal faeces) in non- compostable plastic bags
Garden waste contamination	Flax, cabbage tree leaves, bamboo, palm leaves, rhubarb leaves, soil and rocks
All other contamination	All other materials (including animal faeces not in a plastic bag, animal faeces in compostable bags, animal carcasses, ash, plant pots etc)

The 'Garden waste contamination' category was added after the audit for Council A had been completed. During the Council A audit, materials later defined as 'Garden waste contamination' were categorised as 'All other contamination'.

Table 4.8 shows the proportion of materials in each council area's FOGO bins that is comprised of each type of contamination. Overall, 5.2% of materials in 240-litre FOGO bins, and 7.4% of materials in 80-litre FOGO bins was contamination, and the largest category, by weight, was Garden waste contamination.



Proportion of FOGO bin materials comprised of	240-litre bins				80-litre bins	Average 240-litre
contamination	Council A	Council B	Council C	Council D	Council E	bins
Compostable bin liners	0.3%	0.1%	0.8%	0.2%	0.4%	0.3%
Compostable packaging	0.0%	0.0%	0.1%	0.0%	0.1%	0.0%
All other paper	0.5%	0.3%	1.5%	0.2%	0.8%	0.6%
Food in packaging	0.8%	0.7%	0.8%	0.0%	0.7%	0.6%
Items in plastic bags	0.6%	0.0%	0.2%	0.0%	0.1%	0.2%
Garden waste contamination	0 704	3.3%	3.7%	1.1%	3.2%	1.8%
All other contamination	2.7%	2.0%	1.0%	0.9%	2.2%	1.7%
TOTAL contamination	4.8%	6.4%	8.0%	2.5%	7.4%	5.2 %

Table 4.8 – Proportion of materials that are contamination in FOGO bins,by council area

The average amount of each contamination type (by weight) per FOGO bin from each council area is provided in Table 4.9.

Weight of contamination in		240-lit	80-litre bins	Average 240-litre			
FUGU DITIS	Council A	Council B	Council C	Council D	Council E	bins	
Compostable bin liners	0.04 kg	0.01 kg	0.08 kg	0.03 kg	0.03 kg	0.04 kg	
Compostable packaging	0.00 kg	0.00 kg	0.01 kg	0.00 kg	0.00 kg	0.00 kg	
All other paper	0.06 kg	0.04 kg	0.15 kg	0.02 kg	0.06 kg	0.07 kg	
Food in packaging	0.11 kg	0.09 kg	0.08 kg	0.01 kg	0.05 kg	0.07 kg	
Items in plastic bags	0.08 kg	0.00 kg	0.02 kg	0.00 kg	0.01 kg	0.03 kg	
Garden waste contamination	0.27 kg	0.42 kg	0.10 kg	0.18 kg	0.24 kg	0.23 kg	
All other contamination	U.37 Kg	0.25 kg	0.36 kg	0.15 kg	0.17 kg	0.22 kg	
TOTAL contamination	0.66 kg	0.80 kg	0.79 kg	0.40 kg	0.57 kg	0.67 kg	

Table 4.9 – Contamination in FOGO bins, by council area

Council A allows paper to be used to line food scraps caddies, and to be placed into the FOGO bin with food, therefore, technically this is not contamination and Council A's contamination rate is 0.62 kg (average per household set out).

On average, there is slightly more contamination in 240-litre FOGO bins than in the 80-litre FOGO bins (0.67 kg per set out versus 0.57 kg in 80-litre bins). However, the types of contamination are very similar.



'Garden waste contamination' makes up the largest proportion of contamination in each area (except for Council A where it is included in 'All other contamination').

In all but one council (Council C), 'All other contamination' is the second largest category of contamination.

Table 4.10 shows the proportion of households that set out each type of contaminant, and the average weight of contaminants set out by households that set out that contaminant.

Proportion of households that set out contamination	240-litre bins				80-litre bins	Average 240-	Average kg per	Average kg per
(and average weight per set out)	Council A	Council B	Council C	Council D	Council E	litre bins	80-litre bin	240- litre bin
Compostable bin liners	20%	7%	33%	11%	16%	19%	0.21 kg	0.23 kg
Compostable packaging	1%	1%	3%	1%	5%	2%	0.09 kg	0.13 kg
All other paper	24%	23%	46%	15%	38%	28%	0.15 kg	0.26 kg
Food in packaging	5%	19%	13%	2%	22%	10%	0.24 kg	0.74 kg
Items in plastic bags	3%	1%	0%	1%	1%	1%	1.30 kg	2.08 kg
Garden waste contamination	-	20%	13%	19%	7%	12% ¹	3.32 kg	1.88 ¹ kg
All other contamination	26%	42%	34%	31%	30%	33%	0.56 kg	0.67 kg

Table 4.10 – Proportion of households that set out contamination, and average amount of contamination per household set out

¹ Garden waste from Council A included in 'All other contamination'

The contaminant that is placed into 80-litre and 240-litre FOGO bins by the highest proportion of households is 'All other contamination' (30% and 33% of bins respectively) followed by 'All other paper' (38% and 28% of bins respectively).

In 80-litre FOGO bins, the contaminant that is found in the largest quantity (by weight), is 'Garden waste contamination' (average of 3.32 kg per set out), while in 240-litre FOGO bins, 'Items in plastic bags' are the heaviest contaminant (2.08 kg per set out), though these are rare (set out by 1% of all households).

There is much variability across the council samples for most contaminants, and no obvious reason for this variation.

4.9 Results of attitudinal survey and FOGO bin audits

During the collection of the FOGO bins for the audit in the five council areas, a paper survey was placed in the letterbox of each household from which the contents of a FOGO bin was collected. At the same time, surveys were distributed to other households in the area, that did not have their bins collected. Altogether, 3,000 surveys were distributed.

Of the 3,000 surveys delivered, 1,085 responses were received, for a 36% response rate. The full results of the survey are presented in a separate report by AK Research, *Research into food scraps disposal - Short-form survey and focus group findings*.

Of these 1,085 survey responses, 294 were from households that had their FOGO bin audited (27% of the surveys). These 294 responses are from 29% of the 1,012 households that had their bin audited. The surveys were received from across the five council areas, with 25% of the surveys coming from Christchurch, and the other 75% spread across the four councils with 240-litre FOGO bins.

In this section the results of the survey are compared to the FOGO audit results, for those households that completed the survey and had their FOGO bin audited. These results are presented for all five councils combined due to the smaller sample number.

Only survey questions where there is value in comparing to the results of the FOGO bin audit data are presented in this section.

The survey asked householders how many residents lived at the address, and what age group these residents fell into. The average number of residents per household across the 294 surveys was 2.1 residents. Of all of the residents living in the households that returned a survey and had their FOGO bin audited, 18% were 20 years or under (while 26% of New Zealand's population is 20 or under), and 39% of the residents were 65 or older, while only 17% of New Zealand's population is 65 or older. These survey responses are therefore skewed towards households with older residents.

4.9.1 What are the different ways you dispose of your household food scraps?

The first question of the survey was "What are the different ways you dispose of your household food scraps? Tick ALL that apply".

Table 4.11 presents the results of this question for households that had their FOGO bin audited and completed the survey.

Food scraps disposal methods (multiple may apply)	All samples combined
Place in council-provided FOGO bin	87%
Place in rubbish bin	23%
Compost or worm farm	40%
Feed to animals	20%
Dispose of through an in-sink waste disposal unit	13%
Other	1%

Table 4.11 – What are the different ways you dispose of your household food scraps? – all households that had FOGO bin audited and completed survey

The survey results show that 87% of households claim to dispose of food scraps to their FOGO bin and 40% claim to compost or worm farm food scraps.

While 13% of the households (39 households) said that they didn't use their FOGO bin to dispose of food scraps, the waste audit data shows that 26% of these households (10 households) had food scraps in their FOGO bin. This discrepancy could potentially be due to one member of the household completing the survey, and another placing food scraps in the FOGO bin.

4.9.2 How much food does your household throw away that could have been eaten?

Question 3 of the survey asked householders "Using a 2 litre ice-cream container as a guide, approximately how much food does your household throw away that could have been eaten PER WEEK? Include all food put in your green organics bin, fed to animals, or composted."

This question aimed to quantify the amount of food scraps disposed of by households, that could potentially have been eaten. A 2-litre ice cream container was used as the measure as it is a relatively well known, ubiquitous container, likely to be found in most kitchens.

Table 4.12 - How much food does your household throw away that could have beeneaten PER WEEK? – households that had FOGO bin audited and completed survey

How much food does your household throw away that could have been eaten PER WEEK?	All samples combined
None at all	14%
Less than quarter of one 2-l container	26%
One-quarter to less than one-half of a one 2-l container	14%
One-half of a 2-l container to less than one 2-l container	9%
One 2-l container	15%
Two 2-l containers	12%
Three 2-l containers	5%
Four to five 2-l containers	2%
Six to seven 2-l containers	0%
Eight or more 2-l containers	1%

The answers varied considerably, from households that did not think that they throw any edible food away, to households that believe that they throw away eight or more 2-litre containers per week.

In Figure 4.5, the volume of edible food a household estimates they throw away per week is compared to the actual amount of food in their FOGO bin during the audit. This comparison

is flawed in several ways, as the household estimate is in litres of edible food, while the audit is kilograms of all food scraps, edible and non-edible.

However, Figure 4.5 provides an overview of how much edible food a household thinks they dispose of, and how much food they place into their FOGO bin. Only households that claim to use the FOGO bin as their main food scraps disposal method are included in this analysis.



Figure 4.5 – Estimated litres of edible food and kg of food scraps in FOGO bin

Figure 4.5 shows that there is little correlation between the amount of edible food households think they throw away per week, and the amount of food in their FOGO bin. This is expected to be mostly due to the difficulty involved in guessing what volume of edible food is wasted in a week.

4.9.3 How often does your household use your FOGO bin?

Question 5 of the survey asked how often households use the FOGO bin collection. Seventysix per cent of the households that responded to the survey and had their FOGO bin audited, said that they set out their bin weekly, and a further 16% set it out fortnightly. Six per cent set it out less frequently.

Of the households that stated that they use their FOGO bin to dispose of food scraps, 78% set it out weekly, 17% set it out fortnightly, and 5% set it out less often.

Table 4.13 shows the number of these households that did not have any food scraps in their FOGO bin during the audit, and the average weight of food scraps per FOGO bin for those that did set out food scraps, from the audit data.

The table shows that households that set out their FOGO bin fortnightly set out more food scraps than households that set them out weekly, but they do not set out twice as much food scraps every fortnight. Therefore, overall, households setting their FOGO bins out fortnightly are disposing of less food scraps to their FOGO bin.

FOGO bin set out frequency, and amount of food scraps set out	FOGO bin set out frequency for households that use FOGO bin for food scraps	Average weight of food scraps in FOGO bin (for households that disposed of food scraps to FOGO bin)	% of households that had no food scraps in FOGO bin
Weekly	78%	2.27 kg	15%
Fortnightly	17%	2.79 kg	19%
Less frequently	5%	1.95 kg	38%

Table 4.13 – Frequency of FOGO bin set out and weight of food scraps – allhouseholds that had FOGO bin audited and completed survey

Households that set their bins out more frequently are more likely to have food scraps in their bin and to set out more food scraps overall.

4.9.4 Do you use a kitchen bin to collect food scraps for FOGO bin?

Question 8 of the survey asked householders whether they use a kitchen bin or container to collect food scraps before putting them into their FOGO bin. Table 4.14 shows the proportion of households that use a specially purchased kitchen bin; use a repurposed container, bucket or bowl; or don't use a bin in their kitchen and place food scraps directly into their FOGO bin, for households that completed the survey and had their FOGO bin audited. Council A provides households with a benchtop kitchen caddy to collect food scraps.

Table 4.14 also shows the average weight of food scraps per household, for each disposal method, and the proportion of households using each kitchen disposal method that didn't have any food scraps in their FOGO bin during the audit, across all five councils.

Table 4.14 – Do you use a kitchen bin or container to collect food scraps in your kitchen? – all households that had FOGO bin audited and completed survey

Do you use a kitchen bin or container to collect food scraps before putting them in your FOGO bin?	% of households	Average weight of food scraps in FOGO bin (for households that disposed of food scraps to FOGO bin)	% of households that had no food scraps in FOGO bin
Yes, I use a specially purchased kitchen bin	39%	2.39 kg	20%
Yes, I use a repurposed container, bucket, or bowl	38%	2.61 kg	15%
No, I put my food scraps directly into my FOGO bin	23%	1.56 kg	28%

Approximately the same proportion of households used a specially purchased kitchen bin and a repurposed container (39% and 38%). There was only a slight difference in the average amount of food scraps disposed of between these two kitchen disposal methods.

Only 23% of householders put food scraps directly into their FOGO bin, and the average amount of food disposed of by these households was lower than for households using a kitchen bin (1.56 kg instead of 2.39-2.61 kg). A higher proportion of households that say they put their food scraps directly in the FOGO bin did not have any food scraps in their bin during the audit (28% of these households, versus 15-20% of households using a kitchen bin).

The results for Council A, which supplies households with a kitchen caddy are similar to the other councils.

4.9.5 What do you least like about putting food scraps in your FOGO bin?

Question 11 asked householders what they least liked about putting food scraps in their FOGO bin. The responses for households that completed the survey and had their FOGO bin audited are provided in Table 4.15.

Table 4.15 – What do you least like about putting food scraps in your councilprovided FOGO bin? - all households that had FOGO bin audited and completed survey

What do you least like about putting food scraps in your council-provided FOGO bin?	All samples combined	Average weight of food scraps in FOGO bin (for households that disposed of food scraps to FOGO bin)		
Nothing	44%	1.92 kg		
It attracts fruit flies, rodents and/or vermin	7%	3.73 kg		
It is smelly and dirty	27%	2.56 kg		
Smelly/dirty and attracts flies/rodents	3%	3.44 kg		
I don't use it for food scraps	14%	2.00 kg		
Other	5%	2.15 kg		

Forty-four per cent of households didn't have any reason to dislike their FOGO bin. Thirtyseven per cent thought that it was smelly and dirty and/or attracted fruit flies, rodents and/or vermin.

There is likely to be a correlation between households placing more food scraps in their FOGO bin, and finding that the bin smells, is dirty, or attracts flies/rodents/vermin.

The 14% of households that stated that they don't use the FOGO bin to dispose of food scraps had on average 2.00 kg of food scraps in their FOGO bin. This may be due to one member of the household completing the survey, and another placing the food scraps in the FOGO bin.

4.9.6 Do you have a garden?

Question 12 asked whether the household had a garden. The answers to this question are compared to the amount of food scraps in the FOGO bin in Table 4.16.

Do you have a garden?	All samples combined	Average weight of food scraps in FOGO bin (for households that disposed of food scraps to FOGO bin)	% of households that had no food scraps in FOGO bin
Yes, a large garden	59%	2.12 kg	25%
Yes, a small garden	39%	2.37 kg	24%
No, but I have pot plants	1%	3.70 kg	0%
No, I don't have a garden or pot plants	1%	1.54 kg	50%

Table 4.16 – Do you have a garden? - all households that had FOGO bin audited and completed survey

Almost all of the households that returned a survey had a garden (59% a large garden and 39% a small garden). The average amount of food scraps per FOGO bin was slightly higher for households that had a small garden than for households that had a large garden. Approximately the same proportion of households with large and small garden had no food scraps in their FOGO bin during the audit. The sample of households with no gardens is too small to be representative.

4.9.7 Does the number of householders affect food scraps generation?

The final question of the survey asked how many householders of each age group lived in the house. In Table 4.17, the total number of householders is compared to the average amount of food scraps disposed of to the FOGO bin. The percentage of each household size that did not place any food scraps in their FOGO bin is also provided.

Table 4.17 – Number of residents living in household - all households that hadFOGO bin audited and completed survey

Number of residents in household	% of households	Average weight of food scraps in FOGO bin (for households that disposed of food scraps to FOGO bin)	Food scraps per resident (for households that disposed of food scraps to FOGO bin)
1	28%	1.37 kg	1.37 kg
2	49%	2.02 kg	1.01 kg
3	10%	2.99 kg	1.00 kg
4	8%	3.95 kg	0.99 kg
5	3%	4.39 kg	0.88 kg
6	1%	5.36 kg	0.89 kg
8	0.3%	3.12 kg	0.39 kg



Unsurprisingly, the amount of food scraps increases with the increase in residents (apart from the one household with eight residents). The amount of food scraps per resident is higher for one resident households and decreases ever so slightly as the number of residents increases.

4.9.8 Does householder age affect food scraps generation?

The survey also asked into which age groups the members of the household belong. In Table 4.18 this information is matched with the average weight of food scraps in their FOGO bin. Results are provided for all FOGO bins, and separately for FOGO bins that contained food scraps. The average weight, per set out, of food scraps per resident (for households that had placed food scraps in their FOGO bin) is also included.

Table 4.18 – Types of household and average food scraps disposal - all householdsthat had FOGO bin audited and completed survey

Type of household	# of hhs included	Average # residents per hh	Average set out of food scraps in all FOGO bins per hh	Average set out of food scraps in FOGO bins containing food scraps	Kg food scraps per resident in FOGO bins containing food scraps	% of hh using FOGO bin for food scraps
Households with children 0-20 yrs	65	3.6	3.37 kg	4.06 kg	1.14 kg	83%
Households without children (excl. hhs with only residents 65 yrs +)	85	2.0	1.23 kg	1.72 kg	0.85 kg	72%
Households with only residents 65 yrs +	136	1.5	1.16 kg	1.58 kg	1.03 kg	74%

Based on these results, households with children dispose of 11% more food scraps to their FOGO bin per resident than households with only residents aged 65+, but they dispose of 34% more food scraps to their FOGO bin per resident than households without children.

More households with children use their FOGO bin to dispose of food scraps (83%) than households without children (72%), or households with only resident 65+ (74%).

Note – the survey responses are skewed towards older residents.

4.10 Comparison of food scraps research

In 2022, the Ministry commissioned research into the use of food scraps only collections. This research was also undertaken by SYCL and AK Research. A comparison of some of the key results are provided in this section.

The research on food scraps collections included a participation survey, to determine how often households set out their food scraps bin in a three-week period, an attitudinal survey of households that were not setting out their food scraps bins, focus groups with households using and not using their food scraps bins, and audits of the rubbish bins of households that were not setting out their and that had completed a survey.

4.10.1 Comparison of food only and FOGO collections

As of writing, ten territorial authorities provide a food only collection to their urban residents, and eight provide a FOGO collection.

This research on FOGO collections, and the 2022 research on food only collections, provide data that may assist councils that have not introduced a food scraps service in evaluating the comparative advantages of FOGO and food only collections.

Unfortunately, comparing the effectiveness of food only and FOGO collections remains difficult. A metric that would be of value in making this comparison would be the relative quantities of food scraps, per serviced household, collected by each type of collection.

However, comparing this metric for the two types of collections is complicated by the lack of information on the seasonal variation in the quantity of food scraps in FOGO collections. Although data on the seasonal variation in overall tonnages of FOGO collections is available, the variation in the proportion of food scraps compared to garden waste has not been studied.

To compensate for this lack of information, in this section FOGO and food only collections are compared based on monthly quantities of food scraps collected per serviced household. This has been calculated by dividing the monthly collection tonnage data by the number of households serviced by the collection, using data provided by the councils.

For FOGO collections, the monthly tonnage data is used for the month in which the proportion of food waste was measured by this research. For example, for Christchurch City monthly FOGO tonnage data was used for April 2024, when Council's FOGO bins were audited and the percentage of food scraps in the bins was determined.

For food only collections, data collected for the November 2022 research was used. Councils included in the research on food only collections were asked at the time to provide the number of households with access to their food only collection service and the tonnage of food scraps collected in November 2022. As the 2022 research did not measure the quantity of contamination in the food only collections, a generic figure of 4.8% contamination, from



unpublished research quoted in Section 4.8.2, was applied to the overall tonnage to determine the tonnage of food scraps.

In Table 4.19, the results of this analysis for the four councils involved in the November 2022 research on food only collections are shown.

Table 4.19 – Average weight of food scraps in FO bins per month, based on council tonnage data for November 2022 and number of households in collection area

Food scraps collected through food only collection – Nov 2022	Council 1	Council 2	Council 3	Council 4
Average weight of food scraps per household in serviced area, per month	5.0 kg	3.7 kg	3.6 kg	2.1 kg

The quantity of food scraps collected per household with access to the service, per month varied from 2.1 - 5.0 kg. Possible reasons for the variation include the length of time the food only collection has been provided, the proportion of serviced properties in peri-urban and rural areas, and the proportion of holiday homes and short-term rental properties that are seasonably occupied. The low food scraps quantity in Council 4 is likely to be due to the higher proportion of holiday homes in the area.

Similar information was requested from the five councils included in the FOGO research. These councils were asked for the total number of households that have access to their FOGO collection service, and the tonnage of material collected through the FOGO collection during the month of the FOGO bin audit. These numbers have been combined with the proportion of food scraps found in FOGO bins during the audit, to calculate the average set out of food scraps in FOGO bins, per household with access to the service, per month, in Table 4.20. Not all households use the service, or use the service every week, so this does not represent the average monthly set out per household that uses the service.

Food collected through		240-lit	80-litre bins	Average 240-litre		
FOGO COLLECTIONS	Council A	Council B	Council C	Council D	Council E	bins
Month	Apr-24	May-24	May-24	Apr-24	May-24	-
FOGO tonnes collected	301	39	663	102	4,006	1,105
Households in serviced area	10,378	3,226	21,579	2,825	165,078	37,053
% of food scraps in FOGO bin from audit	9.8%	11.2%	20.3%	12.4%	29.6%	13.1%
Average weight of food scraps per FOGO bin, per household in serviced area, per month	2.8 kg	1.3 kg	6.2 kg	4.5 kg	7.2 kg	3.9 kg

Table 4.20 – Average weight of food scraps in FOGO bins per month, based on council tonnage data and number of households in collection area

The weight of food scraps disposed of to FOGO bins per household in serviced areas, per month, varies from 1.3 kg to 7.2 kg. As with food only collections, possible reasons for the variation include the length of time the FOGO collection has been provided, the proportion of serviced properties in peri-urban and rural areas, and the proportion of holiday homes and short-term rental properties that are seasonably occupied. The low weight of food scraps in Council B is likely associated with the high proportion of properties in the district that are not occupied year-round.

The average weight of food scraps in the 80-l FOGO bins was 7.2 kg, and the average weight of food scraps per 240-l FOGO bin was 3.9 kg. This may be due to bin size, but may also be due to Christchurch being more urban than the other areas, and having a more well-established service than many of the areas.

If the FO council area and the FOGO council area with high levels of seasonally occupied dwellings and short-term rentals are removed from the comparison (Council 4 and Council B), then councils with FO collections are collecting between 3.6 kg and 5.0 kg per month of food scraps (average across all properties with access to the collection service), while councils with FOGO collections are collecting between 2.8 kg and 7.2 kg per month of food scraps.

4.10.2 Contamination levels

As the 2022 study audited rubbish rather than food scraps bins, the level of contamination in food scraps bins in those four council areas is not known. However, separate research



undertaken by SYCL in 2023¹³ analysed contamination levels in food scraps collections delivered to two disposal sites (compost facilities) in the North Island and found that 4.8% of materials collected in food scraps collections at Site 1 and 1.7% at Site 2 were contamination (materials defined as contamination in the collections delivering to those facilities).

This compares to 5.2% contamination in 240-litre FOGO bins, and 7.4% contamination in 80-litre FOGO bins.

However, there is less opportunity for contamination to occur in FO bins, as they accept fewer materials. The FOGO bins included similar contamination as the FO bins, such as plastic and paper, as well as garden waste contamination, such as flax and soil. Garden waste contamination comprised 3.2% of materials in 80-litre FOGO bins and 1.8% of materials in 240-litre FOGO bins. Removing the garden waste contamination from the FOGO bins, results in average contamination levels of 4.2% in 80-litre FOGO bins and 3.4% in 240-litre FOGO bins. These results are similar to the contamination levels found in FO bins.

¹³ Unpublished report for Waikato Regional Council

5. CONCLUSIONS

 The average weight of food scraps per 240-litre FOGO bin was 1.68 kg per set out, while the average weight of food scraps per 80-litre FOGO bin was 34% higher, at 2.25 kg. Households with 80-litre FOGO bins were also more likely to dispose of food scraps to their FOGO bin (79% of their bins contained food scraps) than households with 240-litre FOGO bins (68% of their bins contained food scraps).

As only one council with 80-litre FOGO bins was included in the study, it is not possible to say that providing 80-litre FOGO bins will result in households using them to dispose of more food scraps, as there are other variables, such as how long the service has been available, and the demographics of the populations. It is recommended that further research be undertaken to explore the differences in use of these two bin sizes.

- 2. In the survey, households were asked how often they set out their FOGO bins. When comparing these responses to the audit data, we find that households that set their bins out more frequently are more likely to have food scraps in their bin, and to set out more food scraps overall. This may also mean that they are more likely to set out their bin if they are using it to dispose of food scraps.
- 3. Households using a kitchen bin to collect food scraps set out more food scraps, and are more likely to set out food scraps, than households that put food scraps directly into their FOGO bin. There is less difference in the amount of food scraps in FOGO bins, and the use of FOGO bins to dispose of food scraps, between households that use a specifically purchased (or provided) bin, and households that use a repurposed container.
- 4. Single resident households set out a slightly higher quantity of food scraps (1.37 kg) per resident, per set out, than multi-resident households. The quantity of food scraps set out, per resident, in multi-resident households decreases slightly as the number of residents increases.
- 5. Households with children and households with residents over 65 years of age set out more food scraps than other households.
- 6. The comparison between FO and FOGO collections shows that FO bins captured between 2.1 kg and 5.0 kg of food scraps per month, and FOGO bins captured between 1.3 kg and 7.2 kg per month.
- 7. It is understood that data on FOGO collections are available through council contractors' reporting to councils. This generally includes weekly tonnages of materials collected and the number of households from which material was collected. Opportunities to collect data on participation rates could be explored with collection contractors.

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8. Ultimately, councils considering whether to implement a FO or a FOGO collection will want to consider whether they have processing capacity for both food scraps and garden waste combined, and whether they want to collect garden waste that may already be being collected from many households through private garden waste collections.

APPENDIX A – SURVEY FORM

Your local council Gr	een		
Organics Bin Survey	2024		
1. What are the different ways you dispose of	your household food scraps? (Tick ALL that apply)		
O Place in council-provided green organics bin	O Feed to animals		
O Place in rubbish bin	O Dispose of through an in-sink waste disposal un		
Compost or worm farm	Other (please tell us):		
2. And what is the MAIN WAY you dispose of y	our household food scraps? (Tick only ONE)		
O Place in council-provided green organics bin	Feed to animals		
O Place in rubbish bin	Dispose of through an in-sink waste disposal un		
Compost or worm farm	Other (please tell us):		
 Using a 2Litre ice-cream container as a gui your household throw away that could have include all food put in your green organics b 	de, approximately how much food does been eaten PER WEEK? (Tick only ONE) hin, fed to animals, or composted.		
O None at all	O Two 2L containers		
 Less than quarter of one 2L container 	O Three 2L containers		
 One-quarter to less than one-half of a one 2L container 	O Four to five 2L containers		
One-half of a 2L container to less than one 2L container	Six to seven 2L containers Eight or more 2L containers		
One 2L container			
4. Which of the following do you think ARE all	owed in your council-provided		
green organics bin? (Tick ALL that apply)			
green organics bin? (Tick ALL that apply)	Cooked foods and takeaways		
green organics bin? (Tick ALL that apply) Fresh fruits and vegetables Citrus peels and onion skins	Cooked foods and takeaways Dairy eg cheese, yoghurt		
green organics bin? (Tick ALL that apply) Fresh fruits and vegetables Citrus peels and onion skins Avocado stones and com cobs	Cooked foods and takeaways Dairy eg cheese, yoghurt Bones and shells eg mussel shells		
green organics bin? (Tick ALL that apply) Fresh fruits and vegetables Citrus peels and onion skins Avocado stones and corn cobs Meat and fish 	Cooked foods and takeaways Dairy og cheese, yoghurt Bones and shells og mussel shells		
green organics bin? (Tick ALL that apply) Fresh fruits and vegetables Citrus peels and onion skins Avocado stones and corn cobs Meat and fish Meat and fish Meat of the store of the sto	Cooked foods and takeaways Dairy eg cheese, yoghurt Bones and shells eg mussel shells		
green organics bin? (Tick ALL that apply) Fresh fruits and vegetables Citrus peels and onion skins Avocado stones and corn cobs Meat and fish New often does your household currently u green organics bin collection? (Tick only ONE)	Cooked foods and takeaways Dairy eg cheese, yoghurt Bones and shells eg mussel shells		
green organics bin? (Tick ALL that apply) Fresh fruits and vegetables Citrus peels and onion skins Avocado stones and corn cobs Meat and fish Meat and fish Meat organics bin collection? (Tick only ONE) Weekly	Cooked foods and takeaways Dairy eg cheese, yoghurt Bones and shells eg mussel shells tese the council-provided Less than monthly (occasionally)		
green organics bin? (Tick ALL that apply) Fresh fruits and vegetables Citrus peels and onion skins Avocado stones and corn cobs Meat and fish Meat and fish Meat organics bin collection? (Tick only ONE) Weekly Fortnightly	Cooked foods and takeaways Dairy eg cheese, yoghurt Bones and shells eg mussel shells tese the council-provided Less than monthly (occasionally) We did use it but not anymore		





APPENDIX B – SURVEY INTRODUCTORY LETTER



April 2024

Central Otago District Organics (Green Bin) Survey

Complete online or mail back by 28 April 2024 and go into the draw to win one of ten \$100 Gift Cards.

The Ministry for the Environment is partnering with Central Otago District Council to carry out research into the green bin collections. This is part of a larger national research project on food scrap collections involving several councils around the country. The research aims to understand why people do and don't use the collection service.

By answering a 5-minute survey included with this letter you can help us understand a little more about how your household deals with food and garden waste.

You can send back the survey in the **ReplyPaid envelope** supplied or you can complete online by using the following link, **www.akresearch.co.nz/greenorganicsbinsurvey**

Or QR code



All completed surveys returned by 28 April 2024 will go into the draw to WIN one of ten \$100 Gift Cards.

Further research with a selection of households using focus groups will also be undertaken. This will help improve the organics (green bin) service.

Independent researchers AK Research have been engaged to conduct this part of the research. If you do not want your household to be involved in any further research, you can opt out by emailing the researchers: surveys@akresearch.co.nz

Your confidentiality is assured. AK Research will only report on summarised data and no personal information will be reported upon.

If you have any questions regarding this research project, please get in touch with your local contact:

Abi Hawkins

waste@codc.govt.nz

Waste Minimisation Officer

Good luck and thank you for taking the time to complete and return the survey.

Kind regards,

On behalf of your Council Waste Team



APPENDIX C – MARGINS OF ERROR

Composition of materials in FOGO bins and margins of error	80-l FOGO bins		240-litre FOGO bins	
Food scraps	2.25 kg	(±0.35 kg)	1.68 kg	(±0.22 kg)
Garden waste	4.79 kg	(±0.67 kg)	10.49 kg	(±0.77 kg)
Compostable bin liners	0.03 kg	(±0.01 kg)	0.04 kg	(±0.01 kg)
Compostable packaging	0.00 kg	(±0.00 kg)	0.00 kg	(±0.00 kg)
All other paper	0.06 kg	(±0.02 kg)	0.07 kg	(±0.04 kg)
Food in packaging	0.05 kg	(±0.04 kg)	0.07 kg	(±0.05 kg)
Items in plastic bags	0.01 kg	(±0.02 kg)	0.03 kg	(±0.04 kg)
Garden waste contamination	0.24 kg	(±0.13 kg)	0.23 kg	(±0.10 kg)
All other contamination	0.17 kg	(±0.27 kg)	0.22 kg	(±0.13 kg)
TOTAL	7.61 kg	(±0.70 kg)	12.85 kg	(±0.74 kg)

Food scraps, garden waste and contamination in FOGO bins, average weight per bin and margins of error for 95% confidence level

APPENDIX D – PHOTOS OF MATERIALS IN FOGO BINS



Food scraps

Food scraps



Garden waste – plants from garden



Garden waste - waste apples



Garden waste – lawn clippings

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Compostable bin liners



Compostable bin liners



Compostable packaging



All other paper



Food in packaging – tea bags



Food in packaging – packaged items

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Items in plastic bags



Garden waste contamination - soil



All other contamination - ash



All other contamination – plastic bag



All other contamination - kitty litter



All other contamination – plastic items