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Kaitohutohu Mātanga Pūtaiao Matua ki te Pirimia

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Food rescue in 2022

Where to from here?

The second report in the food waste series from the Prime Minister's Chief Science Advisor, Kaitohutohu Mātanga Pūtaiao Matua ki te Pirimia

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Front cover (top to bottom):

1. Avocados rescued by the Waiheke Resources Trust.
2. Herbs from a Countdown store ready to be collected by a food rescue partner.
3. A community pantry on Aotea Great Barrier Island.
4. A glimpse into a refrigerated KiwiHarvest truck.
5. Volunteers at Satisfy Food rescue. Image credit: Satisfy Food Rescue.

Mā tōu rou, mā taku rourou

ka ora te iwi

Foreword

Kia ora koutou,

This is the second report in a wider piece of work on food waste. Our food waste series synthesises evidence across the whole food system and throughout the food recovery hierarchy. The first report in the series, *Food waste: A global and local problem*, explored why food waste is a problem, what is known about food waste in Aotearoa, frameworks for solutions, and an overview of existing governmental and intergovernmental initiatives to combat food waste.

Food rescue alleviates hunger and ensures that surplus food is eaten by people rather than being wasted or managed at a lower tier of the food recovery hierarchy. This report, the second in the series, begins by outlining the context in which food rescue occurs – an Aotearoa where surplus food and food insecurity coexist. It then details the current operation of the rescue sector, including the sector's growing profile following the advent of the COVID-19 pandemic, and the environmental and social benefits that flow from the sector's work – including the contribution that food rescue can make to climate change mitigation. It identifies key ingredients that underpin the success of the rescue sector, including engaged donors, a policy context that incentivises donation, recognition of the central role of volunteers, a strong culture of food safety, and access to the resources needed to manage the 'surprise chain' of donated food.

Food rescue is an accessible entry point for understanding food waste in Aotearoa. Surplus food that's good to eat clearly shouldn't be wasted, and the rescue sector's work to capture that food for human consumption is a pragmatic solution to a pressing problem, important not just for its environmental benefits but also for its ability to provide food to people experiencing food insecurity. The simple logic of food rescue as a 'no brainer' solution to food waste is deceptive. Although critical today, food rescue is a symptom of a broken food system, with overproduction and waste engorging our carbon footprint. Furthermore, food insecurity can't be solved by charitable food provision in the long term – to be food secure means to have physical, social, and economic access to sufficient, safe, and nutritious food on your own terms.

Framing food rescue as an 'in the meantime' solution helped us to reconcile these two positions: we need food rescue to manage surplus food and alleviate hunger in today's Aotearoa. In the longer term, food waste must be reduced at source through a reimagining of our food systems. Solving food insecurity is beyond the scope of our project. Source prevention of food waste will be covered in subsequent reports.

This report was produced by OPMCSA, with support from a wide reference group of stakeholders and experts. We have benefitted from the insights of many, and have thoroughly enjoyed the Zoom calls, site visits, conferences, and kōrero that have been generously shared with us. Those who fed into this report are acknowledged in the following pages, and the wider food waste project reference group is acknowledged at the end of this report. This report builds on the expert advice on combatting food waste provided to the Environment Committee by Associate Professor Miranda Mirosa in 2019 – we have gained hugely from the work that has come before us.

Subsequent reports in the series will focus on further solutions to combat food waste in Aotearoa across the food system. The series will conclude with a summary report which will collate key messages and recommendations from throughout the project and add bridging recommendations that capture opportunities at the interface between workstreams. To learn more about the report series, visit our webpage where you can find the food waste project framework and publications https://www.pmcsa.ac.nz/topics/food-rescue-food-waste/

If you'd like to contribute to subsequent reports in 2022/23 and we aren't already in touch, please contact info@pmcsa.ac.nz

Ngā manaakitanga,

Professor Dame Juliet Gerrard DNZM HonFRSC FRSNZ
Prime Minister's Chief Science Advisor
Kaitohutohu Mātanga Pūtaiao Matua ki te Pirimia

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Our acknowledgement of the people who have helped us in this mahi reflects their valuable input. Responsibility for any errors and omissions sits with OPMCSA. We have done our utmost to keep track of everyone who has contributed to this project and extend our sincere apologies if we have inadvertently omitted anyone.

This project is unfolding as a series of reports, so we continue to welcome new members to the reference group. If you'd like to be involved in our 2022/23 project, please contact info@pmcsa.ac.nz

We also extend our thanks to everyone who has paved the way for action on food waste, both here in Aotearoa and overseas. We have discovered a rich legacy and growing momentum around food waste minimisation and management, forming an excellent context in which to conduct our work.

Figure 1 (clockwise from top left): Champions 12.3 meeting; University of Otago Food Waste Innovation theme; Visit with the New Zealand Food Network; Visit with KiwiHarvest.

Food rescue report contributors

The below reference group members contributed to the food rescue report by sharing insights, commenting on draft content, providing data, sharing sources, hosting us for visits, or otherwise helping to make this report possible. The wider food waste project reference group is acknowledged at the end of this report.

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Wendy Zhou, Perfectly Imperfect
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Context and summary

Food rescue in context

Food rescue is the process by which surplus food at risk of going to waste is captured for human consumption. While offering an immediate solution to surplus food and contributing to the alleviation of hunger, food rescue doesn't combat the root causes of surplus food or food insecurity, serving as an 'in the meantime' solution while efforts to prevent surplus food at source and alleviate poverty are pursued. In an ideal Aotearoa, the need for food rescue would diminish as transformational food system and societal changes occur. Any strategy or investment in food rescue should ensure it is treated as a complement to, not a substitute for, interventions to prevent the generation of surplus and alleviate poverty and should avoid bedding in wasteful systems.

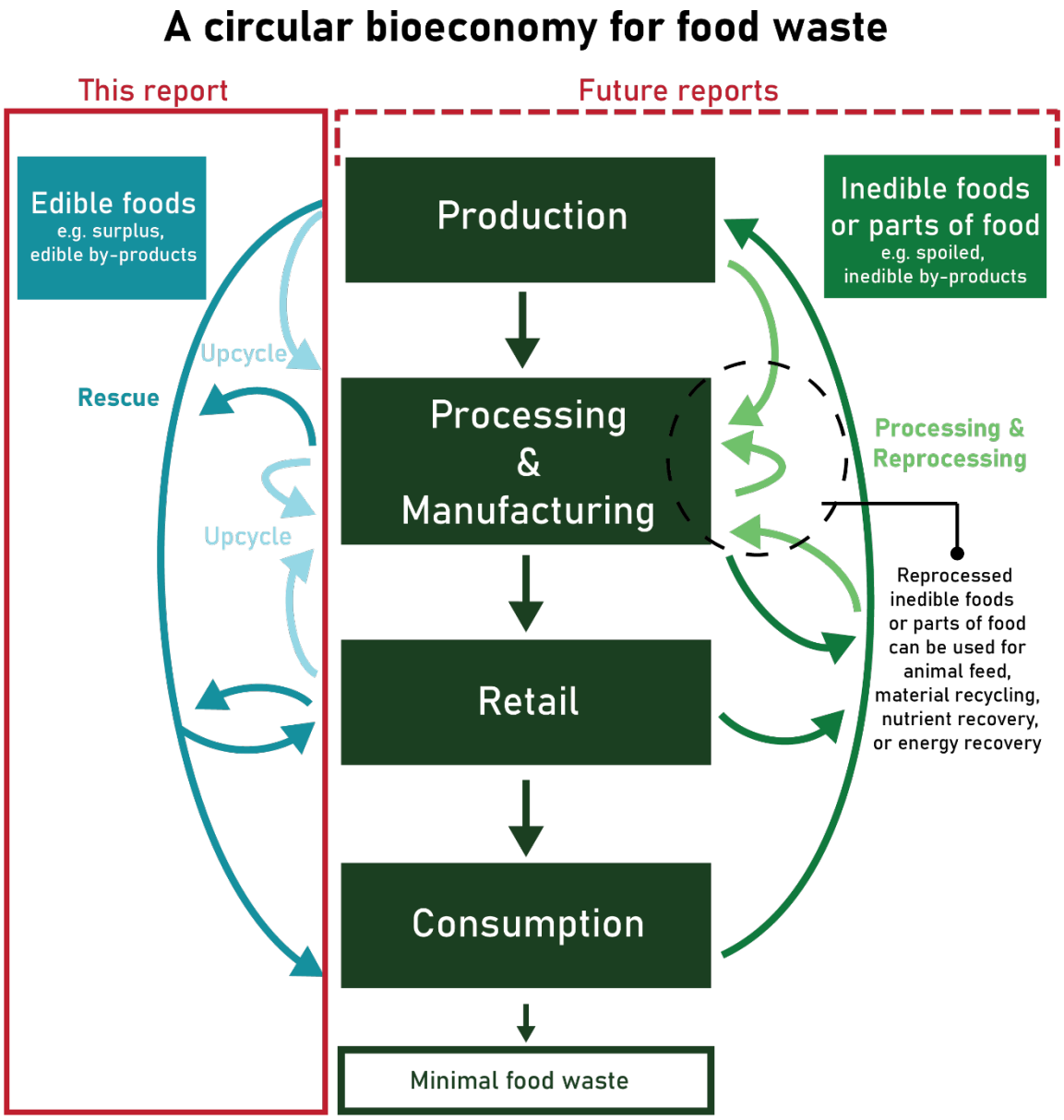

Figure 2: Food waste is a systems problem that needs systems solutions, with this report covering just a fraction of the solutions available. This report focuses on food rescue and (to a lesser extent) upcycling as it occurs in the context of food rescue, as indicated by the red box on the left-hand side of the diagram. Subsequent reports in the 2022/23 OPMCSA food waste series will cover other solutions for food waste, including those relating to source prevention of surplus food and food waste throughout the supply chain, upcycling and recycling of unprevented (including unpreventable) food waste, and nutrient and energy recovery. The food waste series will conclude with a summary report.

Food rescue currently occupies a small but significant niche in the food waste puzzle (see figure 2). Food rescue stops surplus food from being landfilled, composted, or otherwise managed at a lower tier in the food recovery hierarchy (see glossary), but likely captures less than 1% of recovered and unrecovered food waste in Aotearoa. Efforts to strengthen the sector's capacity and increase the volume of surplus food that is donated will boost the proportion of food captured by the rescue sector. However, there will always be streams of food waste that the sector can't help with, such as inedible components of food, post-consumer food waste, and inedible by-products of food processing. This highlights the crucial need to tackle food waste collaboratively and with a suite of solutions, as described in the first report in the OPMCSA food waste series, *Food waste: A global and local problem*, which is available on our webpage https://www.pmcsa.ac.nz/topics/food-rescue-food-waste/

Food rescue currently occupies a small but significant niche in the food waste puzzle …

The food rescue sector in Aotearoa

A diverse range of organisations engage in food rescue in Aotearoa, employing different operating models and working on different scales. Described as the 'food superhighway,' the New Zealand Food Network (NZFN) rescues bulk food at risk of going to waste, primarily from producers, processors, and manufacturers. That food, along with purchased food, is distributed to 61 community food hubs, which pass the food along to food insecure communities.

Community food hubs, mixed-model food rescue organisations, and freestore organisations engage in food rescue (see glossary). Compared with NZFN, they operate at the local level and primarily rescue surplus food from the retail and food service sectors. Each model of food rescue has unique strengths (as well as challenges), and rescue organisations strive to be responsive to their local context. Food rescue organisations often use food to facilitate access to wrap around social support, build community, and foster engagement in broader environmental practices like composting and community gardening. Representing the majority of food rescue organisations in Aotearoa, the Aotearoa Food Rescue Alliance (AFRA) is a collaborative capacity-building organisation that helps food rescue organisations share and adopt best practice, and advocates to government and prospective food donors on its member's behalf.

In addition to formal food rescue efforts, community pantries are distributed throughout the country, and informal community sharing of food also contributes to surplus food management. While charitable models of food rescue currently dominate, food rescue as a social enterprise is an emerging trend. Technology platforms to connect food rescue organisations or individuals in the community to surplus food are another growing trend internationally and in Aotearoa.

New Zealand's food rescue sector has expanded considerably in the last three years. Rescue organisations have been operating in the country for over a decade (and their precursors have been operating for even longer), with support from philanthropists, members of the public, local government, and the Ministry for the Environment's (MfE) Waste Minimisation Fund. The COVID-19 pandemic catalysed a significant boost in central government support for the sector in 2020, with funding and initiatives stepped up across multiple government departments. Of particular significance was the funding provided for the establishment of NZFN and AFRA.

New Zealand's food rescue sector has expanded considerably in the last three years.

COVID-19 and the associated pandemic control measures disrupted food supply chains and hampered physical and financial access to food for many New Zealanders. This exposed and exacerbated the extent of surplus food and food insecurity. The rescue sector played a pivotal role in redistributing surplus and purchased food to communities in need at this time. While adept in a crisis, the rescue sector's work is needed in normal times too. New Zealand's current food system generates substantial volumes of surplus food – the extent of which hasn't been robustly quantified at the national level – and 13.4% of children live in households experiencing moderate-to-severe food insecurity. Income inadequacy is the primary driver of this food insecurity, with Māori and Pacific peoples disproportionately affected.

The rescue sector's impact

… approximately 11,500 tonnes of food were rescued in 2021.

Food rescue has positive social and environmental impacts. To measure those impacts, it is necessary to first understand how much food is rescued. Based on data from NZFN and AFRA, approximately 11,500 tonnes of food were rescued in 2021. AFRA is leading data strengthening efforts, so the coming year should see a significant improvement in the quality and granularity of data. However, data gaps will persist for food rescue efforts occurring outside of NZFN and AFRA.

Food rescue can contribute to social good by nourishing people, including those experiencing food insecurity, and can provide broader social benefits including: contributing to community building and a sense of whanaungatanga or belonging; linking people experiencing food insecurity to wrap around services; and providing an opportunity for volunteerism and the associated benefits. A recent New Zealand-based study estimated that every dollar invested in food rescue provides a social return of $4.50.

While nourishing people is one of the leading social benefits of the rescue sector's work, current tools for measuring that benefit are blunt and don't put nutrition in the foreground. Research into the nutritional impacts of food rescue is needed, as well as research to understand the degree of choice and cultural suitability of rescued food delivered to people experiencing food insecurity.

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The environmental benefits of food rescue can be articulated in terms of abatement of end-of-life environmental impacts or viewed through a life cycle lens. Looking just at the end-of-life environmental impacts of food rescue, capturing food for human use means less food managed at lower tiers of the food recovery hierarchy, such as being sent to landfill or being left on farms. The emissions impacts and other environmental harms, such as leaching, are therefore decreased when food is rescued. MfE uses emissions factors for four end-of-life food waste destinations: landfill with gas capture, landfill without gas capture, composting, and anaerobic digestion. These emissions factors can inform calculations relating to the end-of-life emissions abatement benefits of food rescue.

However, as described in *Food waste: A global and local problem*, most of the environmental harm from our food systems occurs during the early stages of the food supply chain, especially during production, rather than at the end of a food product's life. Where a life cycle approach is taken, with

rescued food being assumed to negate some of the need to produce additional food to meet people's caloric and nutritional needs, the environmental benefit ascribed to food rescue is significantly greater. However, it's not universally accepted that this is an appropriate methodology given that, in an ideal food system, surplus food would be prevented at source.

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Appraising the life cycle environmental benefits of food rescue – the approach used in the New Zealand food rescue sector at present – is both contested and methodologically challenging, being highly sensitive to assumptions. When food types are aggregated to provide a single emissions savings value per unit of food rescued, estimates range from approximately 0.4 to 2.7 kg CO_2e/kg food rescued. When broken down by food type, rescued meat has the largest climate impact. If it is assumed that the rescued meat prevents the production of an equivalent quantity of the same product, the associated averted emissions exceed 20 kg CO_2e/kg meat rescued. Similar methodological challenges are associated with calculating the water use impacts of food rescue. Robust, New Zealand-specific emissions and water use factors with agreed assumptions for food rescue would help the sector communicate its impact and enable comparisons to more readily be made between surplus food management alternatives. We will continue to explore climate and environmental impact quantitation in subsequent reports.

Food safety in the rescue ecosystem

Ensuring that rescued food is safe for recipients is crucial. Everyone has a right to be confident that their food is safe, whether it is purchased or donated. In addition, giving donors confidence in the food safety practices of the rescue sector can bolster donations by relieving donor's anxiety that a food safety incident in the rescue sector could occur and damage their reputation. While only food that is traded is subject to food safety legislation, everyone in the rescue ecosystem has a duty of care to promote the microbiological, chemical, and physical safety of food provided to recipients (see glossary).

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Food safety starts with the donors. Donated food should be safe and suitable not just when it is donated but also by the time it reaches the end user, which can take a day or more. AFRA has developed a *Food Safety Guide* with support from the Ministry for Primary Industries (MPI), in line with international best practice. This guide is of value to both donors and food rescue organisations but has gaps that should be addressed in future iterations. For example, the guide recommends against accepting home prepared food products and non-commercial meat (e.g. game and fish caught non-commercially), food types that we know are accepted by some rescue organisations. Other gaps include nuanced guidance regarding catering surplus (with a need to distinguish between pre- and post-consumer surplus) and withdrawn and recalled products.

For commercial donors of surplus food, the Good Samaritan clause of the *Food Act 2014* provides legal protection from food safety concerns that arise downstream of their donation. The clause

needs to be clarified, further socialised, and tested to ensure it is fit for purpose in the face of a trend towards social enterprise models of food rescue. The *Animal Products Act 1999* lacks an equivalent clause; if this is found to be a barrier for donations from prospective donors operating exclusively under the *Animal Products Act 1999*, a similar provision could be added.

The state of play for food safety practices in the rescue sector isn't well understood. Research combining a qualitative exploration of current practices and quantitative investigation of the safety of rescued food (with a focus on microbiological safety) should be undertaken to support the design of strengthened, standardised food safety training in the rescue sector, with sufficient flexibility to suit different food rescue operating models, many operating with a volunteer workforce.

Empowering the end user is another way that food safety can be enhanced in the rescue sector. MPI estimates that half of all food poisoning cases occur in the home, with handling, storage, and preparation practices serving as important mitigants. People who learn to cook in structured training environments and who are provided with key food safety information on food products are likely to be better equipped to display good food safety practices at home.

Ingredients for success in the rescue sector

Opportunities exist to strengthen the rescue sector in Aotearoa and bolster surplus food donations. Key opportunities, alongside those described above in relation to food safety, are detailed below.

There are financial barriers to food rescue in some contexts, such as the costs associated with the recovery and processing of culled wild animals or the harvesting of surplus produce. Overcoming these barriers could unlock significant volumes of surplus food for the rescue sector – for example, in Central Otago alone, over 4,000 tonnes of fruit go unharvested annually. In addition, multiple countries provide tax deductions or credits to donors of surplus food. Exploring similar tax conditions in Aotearoa, using the temporary income tax exemption on trading stock donations introduced in the context of COVID-19 as a starting point, would likely increase surplus food donations, based on overseas precedent.

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Ensuring that the rescue sector is resourced in a sustainable and balanced way so that it can rescue food regularly, reliably, collaboratively, and safely is crucial to giving donors the confidence to donate surplus food and ensuring food rescue is a logistically workable option for them. While central government support for food rescue was catalysed by COVID-19, funding beyond mid-2023 is uncertain. Beyond central and local government, the private sector (including food donors) and philanthropists will continue to have a role to play. An understanding of future governmental support could enable a more strategic approach to co-funding.

Overseas, government funding is often available to support food rescue. It is viewed as particularly important where there is government direction to donate surplus food, to avoid swamping the rescue sector with food it doesn't have the capacity to handle. Private sector funding sources also play a role overseas, including a fee for service in some cases. An increased waste levy and tax incentives for donors would likely be needed to promote the feasibility of fee for service in Aotearoa, a model that could be piloted to explore its potential to contribute to the sustainable

operation of the rescue sector. We are not aware of any countries where food rescue activities are currently eligible to earn carbon credits in government carbon markets. Inclusion of food rescue organisations as earners of carbon credits in New Zealand's Emissions Trading Scheme (ETS) doesn't align with the structure and purpose of the ETS. However, a voluntary carbon standard has recently been developed, which could be explored for use by organisations engaged in food rescue in Aotearoa.

Consistent training, upskilling, and resourcing for donors would also be valuable, with the amount and quality of food rescued depending significantly on the practices of people working in food production, processing and manufacturing, retail, and the food service sector. In rescue organisations, volunteer knowledge and skills are important enablers of food rescue. Celebrating and investing in volunteers is crucial to the rescue sector's work.

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Technological aids to food rescue are being trialled or implemented in Aotearoa. For example, Countdown is rolling out a technology-based food recovery hierarchy decision tree; NZFN has an online registration system for donors and recipients; AFRA has recently launched an online data platform; and digital platforms are emerging at home and globally to link surplus food with potential recipients and support informal share economies. Using these aids to support the rescue sector could help smooth operations, boost donation volumes, and enhance data collection and quality.

Cooking and processing rescued food could help more to be captured. For example, the shelf life of produce could be extended, partially damaged products could be salvaged, or food products that are inedible without modification could be made edible. Rescue organisations are increasingly investing in the resources needed to expand into this area and could be supported in these efforts. Upcycling will be explored in more depth in later reports.

There are also potential policy levers with bearing on the wider food waste challenge – such as banning food waste to landfill, developing a national food waste strategy and action plan, and setting a food waste reduction target – which have the potential to support the food rescue sector. Because these solutions are relevant to multiple pieces of the food waste puzzle, they will be addressed in our final summary report.

Recommendations

Recommendations in the OPMCSA food waste series will be made under five themes. Each substantive report in the series will contain recommendations, starting with the present report on food rescue. The themes are listed below, as well as the recommendations relating to food rescue.

Systems problem, systems solutions		R1: Develop an interagency strategic action plan for food rescue.[a]
Measure and monitor		R2: Understand surplus food, food insecurity, and the rescue sector's capacity with greater granularity. R3: Strengthen data and research on the rescue sector's impact.
Prevent food waste at source		*There are no recommendations under this theme. Source prevention of food waste will be covered in future reports in the series.*
Save good food for people		R4: Stop surplus food from being managed lower in the food recovery hierarchy by empowering donors and the rescue sector to redistribute surplus food to people, while noting that source prevention of surplus food is the priority intervention. R5: Support the rescue sector to operate with high food safety standards, protecting recipients and enhancing donor engagement.
Capture value from unavoidable food waste		R6: Support the rescue sector to manage any food waste associated with its activities according to the food recovery hierarchy.

Each recommendation contains detailed sub-recommendations. For each sub-recommendation, we provide an indicative timeframe for implementation.

- **Next 12 months** – These recommendations should be considered for immediate implementation, to capture existing momentum and make the most of low-hanging fruit.
- **By 2025** – These recommendations might take a little longer to implement but should be pursued in the near term to keep Aotearoa on track to a future without food waste.
- **By 2030** – The United Nations Sustainable Development Goal (SDG) 12.3 calls for per capita retail and household waste to be halved by 2030, and for food loss to be reduced elsewhere in the food system. These recommendations should be considered for implementation by 2030, in pursuit of SDG 12.

The recommendations from all reports in the OPMCSA food waste series will be brought together in the summary report, where we will also introduce additional recommendations to capture opportunities at the interface between workstreams, as well as overall systems solutions.

[a] NB: The recommendations for each report will be assigned a letter code so that they can be distinguished when brought together in the summary report. Recommendations from the present report are prefixed with an 'R' to indicate 'Rescue.'

Theme 1: Systems problem, systems solutions

Combatting food waste requires people throughout the food system and in the waste management sector to work collaboratively towards a shared vision. To achieve this, we need a national food waste strategy and reduction target, and coordination mechanisms that empower stakeholders to bring the shared vision to life.

Food rescue recommendations for theme 1

R1: Develop an interagency strategic action plan for food rescue.

Next 12 months	By 2025	By 2030	Considerations
a) Develop a strategic action plan for food rescue. A suitable strategic action plan could: **i.** be developed by a lead Ministry, with strong support from other Ministries; **ii.** be developed in partnership with food donors from across the food supply chain, rescue organisations, including Aotearoa Food Rescue Alliance (AFRA) and its members and non-members, and the New Zealand Food Network (NZFN), Kore Hiakai, local government, Māori organisations, and people experiencing food insecurity; **iii.** provide medium- to long-term clarity on rescue sector	**b)** Monitor and evaluate the implementation and impacts of the food rescue strategic action plan and refresh it if necessary.	**c)** Review the long-term capacity needs of the food rescue sector in the light of progress made to address the root causes of food insecurity and surplus food.	The strategic action plan for food rescue from **R1.a** could build on existing work in the Ministry of Social Development (MSD) with support from the Ministry for the Environment (MfE) and the Ministry for Primary Industries (MPI), and would need to dovetail with wider strategic efforts in the food waste space, likely led by MfE (to be covered in subsequent reports and recommendations). As we progress through the OPMCSA food waste series, we will add recommendations relating to a national food waste strategic action plan and overall coordination, beyond food rescue. A strategic action plan for food waste should honour our international commitments and align with

	resourcing to enable strategic, collaborative initiatives in the food rescue sector; **iv.** be informed by insights from the evaluation of COVID-related food rescue initiatives and experiences; **v.** complement efforts to tackle the root causes of surplus food and food insecurity; and **vi.** include an aspirational end date for the need for food rescue to alleviate hunger and minimise surplus food.			Sustainable Development Goal (SDG) 12.3. Following the 2020 Environment Committee briefing on food waste, the government has already agreed to adopt a national definition of and measure of food waste and include reducing food waste with a reduction target as part of a national waste strategy and implementation plan. We wholeheartedly endorse this action.

Theme 2: Measure and monitor

We need to know more about food waste in Aotearoa. Not just how much food is wasted, but where in the food system that waste occurs, current diversion practices, dominant food waste types, and geographic variation in waste volumes. Good data is crucial to articulating the challenge, galvanising action, designing well-targeted interventions, and monitoring progress.

Food rescue recommendations for theme 2

R2: Understand surplus food, food insecurity, and the rescue sector's capacity with greater granularity.

Next 12 months	By 2025	By 2030	Considerations
a) Build on and support existing efforts to understand where food rescue organisations and other community food providers are located, with the aim of supporting connectivity between food rescue organisations and donors and providing insight into national food rescue coverage. **b)** Assess the current capacity of the food rescue sector, including an evaluation of its infrastructure needs (e.g. refrigerated transport and storage, freezer capacity) and opportunities to leverage existing infrastructure from the commercial sector (e.g. seasonal cold stores when not in use).	**d)** Develop a more detailed picture of food insecurity in Aotearoa, leveraging the Ministry of Health (MoH) New Zealand Health Survey (NZHS) and nutrition survey, the latter of which is currently being scoped. **e)** Assess whether the distribution and quantity of food support matches needs, drawing insights from international best practice (e.g. Foodbank Australia's Hunger Map project). **f)** Commission research on the impact of rescued food on the health and wellbeing of people experiencing food insecurity, with a nutrition focus. This should build on Kore Hiakai's food parcel research and draw on data gathered by AFRA.	**h)** Assess whether the changing climate and geopolitical events have brought the predicted increase in disruptions and exogeneous shocks to food systems and review whether the capacity of the food rescue sector and its infrastructure is still fit for purpose in this context.	Because the rescue sector is continually changing, efforts will be needed to ensure any rescue sector mapping work (see **R2.a**) remains accurate and up to date. **R2.c** will be elaborated in subsequent reports. In addition to **R2.h**, further recommendations relating to the impacts of climate change on food systems and food waste will be made in subsequent reports.

c) Gather more granular data on surplus food, leveraging the MfE food waste baseline calculation work.	**g)** Commission research to investigate the degree of choice and cultural suitability of rescued food delivered to people experiencing food insecurity.		

R3: Strengthen data and research on the rescue sector's impact.

Next 12 months	By 2025	By 2030	Considerations
a) Support the food rescue sector's existing efforts to gather robust data on the volume and types of food rescued. The data requirements and impact evaluations required by government should be aligned with one another. **b)** Develop a more robust meal estimate that can be used to support communication and evaluation of the social impacts of food rescue, drawing insights from the Kore Hiakai Standard Food Parcel measure and international best practice.	**c)** Evaluate and refine the rescue sector's data collection and investigate whether affordable technology can increase efficiency of data collection. **d)** Commission research into the environmental impacts of food rescue in the New Zealand context, with a focus on water usage and greenhouse gas emissions, and including a life cycle lens. Include a focus on the most appropriate assumptions to enable fair comparisons with other food recovery options.	**e)** Analyse research in social, environmental, and nutrition domains to further understand the trade-offs and choices associated with food rescue. **f)** Use robust national data to inform assessment of future food rescue sector capacity needs. See also **R1.c**. **g)** Commission research to understand how the food rescue networks are best positioned to operate as food supply routes in the event of a natural disaster or similar.	Affordable technology to support **R3.c.** might include weighing scales in trucks, rapid scanning equipment, standardised software, etc. **R3.d** will connect to recommendations in subsequent reports looking at the environmental impact of different solutions to food waste.

Theme 3: Prevent food waste at source

Preventing food waste at the source has scope to deliver the greatest environmental, social, and economic benefits throughout the food system, and everyone has a role to play. A high degree of connectivity means that New Zealanders can contribute to food waste prevention not just at their stage of the food supply chain, but throughout the system.

Food rescue recommendations for theme 3

There are no recommendations under theme 3 from this report. Source prevention of food waste will be covered in future reports in the series.

Theme 4: Save good food for people

Good food is not a waste stream to be managed – it is a resource for nourishing people. Surplus food, imperfect but nutritious produce, and edible by-products are examples of food, not food waste. Resources, systems, and enabling conditions that promote food rescue and upcycling are crucial to ensuring edible food is never treated as waste.

Food rescue recommendations for theme 4

R4: Stop surplus food from being managed lower in the food recovery hierarchy by empowering donors and the rescue sector to redistribute surplus food to people, while noting that source prevention of surplus food is the priority intervention.

Next 12 months	By 2025	By 2030	Considerations
a) Review the outcomes of the temporary tax exemption for trading stock donation and consider extending it indefinitely for surplus food. **b)** Continue exploring feasible models and circumstances for the recovery and processing of culled wild animals for use in the rescue sector, alongside existing work on commercial opportunities. **c)** Ensure that credit stock arrangements and other aspects of relationships between food suppliers and retailers or other customers don't block the donation of surplus food and give recognition to the correct party.	**i)** Clarify section 352 of the *Food Act 2014*. MPI could consider: **i.** providing an authoritative interpretation of section 352, which addresses existing ambiguities; **ii.** if required in the light of R4.i.i, updating and strengthening section 352 so that it still applies if not-for-profit recipients charge a fee for the food they upcycle and/or distribute; and **iii.** undertaking outreach to donors and food rescue organisations to ensure the legal context relating to food rescue is understood. **j)** Investigate whether the absence of a liability protection	**n)** Review the need for increased or decreased food rescue incentives in the light of progress to address the root causes of food insecurity and surplus food. See also R1.c.	R4.a could be supported by outreach to ensure the tax exemption is understood by donors and prospective donors. R4.d could be supported by an exploration of funding models, resourcing gleaners, and incentivising primary producer engagement, building on international best practice. R4.d will be elaborated later in the series. See also R4.k. R4.f could include consideration of an accreditation system that enables food rescue organisations to issue receipts. R4.h could be supported by data gathered by AFRA on the volume of food waste handled by food rescue organisations, supplemented by

d) Empower gleaners and/or primary producers to harvest surplus produce at risk of going to waste for donation to the food rescue sector. **e)** Scope options to resource the rescue sector in a balanced and sustainable way that fosters sector collaboration so that the sector's capacity doesn't constrain the amount of food that can be rescued. A range of models could be considered. This recommendation builds on **R2.b**. **f)** Pilot a fee for service food rescue model to test its feasibility in the New Zealand context and identify factors that would be required for it to be a suitable model. **g)** Support surplus food donors to adopt technological enablers of effective donation. See also **R3.c**. **h)** Implement measures to reduce the amount of food wasted during the process of food rescue.	clause for donors operating exclusively under the *Animal Products Act 1999* serves as a barrier to donation and amend the legislation if it does. **k)** Investigate the development of food rescue-specific tax incentives, drawing on international insights. **l)** Review the impact of waste levy changes and other developments in the waste management landscape on the feasibility of a roll out of fee for service food rescue, building on the pilot work in **R4.f**. **m)** Support the personal and professional development of paid staff and volunteers in food rescue organisations. See also **R5.e**.		research looking at waste resulting from food rescue organisations refusing food from donors as well as the amount of distributed food that is subsequently wasted once it reaches recipient organisations and individuals. It could also look at the volume of food waste associated with managed and unmanaged community pantries and fridges. **R4.i.ii** will reduce the risk of food rescue organisations experiencing reduced donation volumes if they transition to social enterprise models. **R4.k** could consider providing tax incentives not just for the donation of surplus food, but also for the cost of logistics associated with getting rescued food from donors to recipients. **R4.k** could also include consideration of GST rules that prevent food rescue organisations from claiming GST on expenses relating to GST-exempt food donations, and whether this is a barrier to sustainable food rescue operations. We considered recommendations relating to the inclusion of rescue organisations in the Emissions

			Trading Scheme (ETS) as earners of New Zealand Units but opted not to include this because it doesn't align with the structure and purpose of the ETS (see section 3.3). A standard for inclusion of food rescue in voluntary carbon markets has recently been developed, which could be explored for use by donors and/or food rescue organisations. As we progress through the OPMCSA food waste series, we will explore whether recommendations relating to banning surplus edible food or all food waste to landfill are feasible and supported by evidence, as well as recommendations relating to a requirement to give regard to the food recovery hierarchy. Because these recommendations have implications that extend beyond the food rescue sector, we will explore them later in the series. A well-resourced food rescue sector would help enable legislative change of this nature.

R5: Support the rescue sector to operate with high food safety standards, protecting recipients and enhancing donor engagement.

Next 12 months	By 2025	By 2030	Considerations
a) Support AFRA to address guidance grey zones, gaps, and inconsistencies in updates to the AFRA *Food Safety Guide*, including by clarifying guidance relating to food donated by private individuals, catering surplus (including a diverse range of scenarios), recalled and withdrawn products, packaged and unpackaged food (including food with damaged packaging), and homekill and recreational catch. Ensure consistent guidance is followed by donors, rescue organisations, and downstream charities, while allowing for variation depending on operating context. **b)** Undertake research to understand: **i.** current food safety practices, knowledge, and training arrangements within food rescue organisations; and **ii.** the microbiological safety of rescued food.	**e)** Develop accessible and targeted training for food rescue organisation staff, volunteers, and donors. This training should be nationally consistent while allowing for variations depending on rescue model and local context. It should be consistent with the AFRA *Food Safety Guide* and any future food safety guidance for the rescue sector. See also **R5.a** and **R5.c**. **f)** Resource the food rescue sector for food safety, including ensuring rescue organisations have fridges, freezers, and refrigerated vehicles and exploring expanded provision of community fridges. Emissions should be considered in investment decisions. See also **R2.b**. **g)** Support the food rescue sector and downstream charities to promote safe food practices among recipients of rescued food.	**i)** Review food safety practices in the food rescue sector, making comparisons with international practices.	**R5.a** would benefit from a pragmatic approach informed by current practices. While there are some donation categories that carry higher risk or risk that is harder to manage (e.g. home-prepared food), a pragmatic approach would involve acknowledging that these practices do sometimes occur and providing guidance on how to best manage food safety risks. Annex 2 could be used to support this work. Consider resourcing community cooking classes as part of the response to **R5.g**.

c) Develop guidance for rescue organisations regarding food safety when cooking or otherwise processing rescued food for distribution to recipients. **d)** Scope a labelling system for rescued food, to be applied by donors and/or rescue organisations – e.g., frozen on, use immediately after thawing, reheating instructions, etc.	**h)** Explore options to enable meat to enter the regulated meat system more readily (instead of being regarded as homekill or unregulated game), such as investment in local or mobile meat processing facilities.		

Theme 5: Capture value from unavoidable food waste

There will always be some waste in our food system, which must be managed to capture value in alignment with circular economy thinking and the food recovery hierarchy. Diversion to animal feed and investment in material, nutrient, and energy recovery from food waste will ensure there are decent end-of-life options for unavoidable food waste. Landfilling food waste has no place in our waste management future.

Food rescue recommendations for theme 5

R6: Support the rescue sector to manage any food waste associated with its activities according to the food recovery hierarchy.

Next 12 months	By 2025	By 2030	Considerations
a) Ensure that food rescue organisations have access to food waste management solutions that are consistent with the food recovery hierarchy, for the management of any incidental waste occurring through their activities.			For **R6.a**, where food waste management comes at a cost and can be attributed to donor practices (e.g. donating food that is unsafe or unsuitable for human consumption, or doesn't have a sufficient shelf life buffer), mechanisms for returning donated food or enabling donors to cover the costs of managing that food waste could be considered.

1. Food rescue in context

1.1 The rescue sector feeds people and stops food from going to waste

The food rescue sector, which evolved from foodbanks and the freegan movement (see section 2.1 and glossary), is an ecosystem involving food donors, rescue organisations, downstream charities, and food insecure communities (see figure 3). Together, these stakeholders work to capture surplus food at risk of going to waste and redistribute it to people in the community. Diverting food from landfill or other management options lower in the food recovery hierarchy (e.g. animal feed, compost) has two main benefits: nourishing people, and reducing the environmental footprint of surplus food (see section 3).[1,2] Additional positive social impacts produced by the rescue sector include the value of connections, community building, volunteering, freeing up of recipient's income for other needs, and the opportunity for food insecure recipients to connect to wrap around services.[1,3] For donors, as well as knowing that they are contributing to social and environmental good, food rescue can lead to financial savings through reduced waste management costs and reputational gains associated with displaying social and environmental responsibility.[3-5] Food rescue also makes food waste visible and drives donors, volunteers and the public to engage with the topic, so has the broader benefit of raising awareness and promoting public discourse and potentially broader action on food waste.

1.2 But it's complicated

Many food rescue organisations in Aotearoa cite a joint mission of combatting food waste and alleviating food insecurity,[6-9] both of which are important goals. However, food insecurity has its roots in poverty, and occurs in a context of policies and economic constraints that form a system which allows food insecurity to perpetuate (see section 1.4). Charitable provision of food is insufficient to address food insecurity.[10-12] Meanwhile, surplus food results from a mismatch between supply and demand, which stems from a variety of systemic, technical, cultural, social, and exogenous factors (see section 1.3). The rescue sector doesn't directly tackle the root causes of either food insecurity or surplus food. While root causes solutions are pursued, the rescue sector performs a crucial role in preventing surplus food from going to waste and contributing to the alleviation of hunger resulting from food insecurity.[1]

We heard from many stakeholders that in an ideal world food rescue wouldn't be needed due to meaningful progress on source prevention of surplus food and alleviation of poverty. Food rescue can usefully be framed as an 'in the meantime' solution, alleviating immediate hunger and combatting food waste while systematic solutions to address food insecurity and to prevent surplus food generation at source are pursued.[1,3,13] While combatting the root causes of food insecurity is beyond the scope of the food waste project, source prevention of food waste is in scope, and will be addressed in subsequent reports in this series. In sections 1.3 and 1.4 below, we briefly explore food insecurity and surplus food in Aotearoa, providing the context for the current report.

Food rescue can usefully be framed as an 'in the meantime' solution, alleviating immediate hunger and combatting food waste while systematic solutions to address food insecurity and to prevent surplus food generation at source are pursued.

Figure 3: Simplified schematic showing flows of food through the food rescue ecosystem. The left-hand side shows commercial donors of surplus food, who operate in the regulated food system, as well as highlighting scenarios in which the regulatory context of surplus food donation is less clear, including donations from individuals outside of the regulated food system, catering surplus, and recalled and withdrawn products (see section 4 and annex 2). Note that NZFN distributes rescued surplus food as well as donated and purchased food, as indicated by the partial shading of the relevant box (see also figure 8). NZFN delivers food to food rescue organisations (as shown in the schematic) as well as other community food hubs which themselves may not perform a food rescue function (not shown). Abbreviations: NZFN = New Zealand Food Network. Image credit: OPMCSA intern Richard Marks, Centre for Science Communication, University of Otago.

1.3 Surplus food is driven by a wide array of factors

Surplus food is quality, safe, edible food that is at risk of being wasted if it isn't used, distinct from food that is spoiled, damaged, contaminated, past its use-by date, or otherwise no longer fit for human consumption.[14] It comes about when food doesn't move through the food supply chain to a consumer, usually when it doesn't make it to market or, once at market, doesn't get purchased.[15] Through this lens, surplus food can be understood as food with limited market value in its present state, but with its potential value as a food product still intact.[15] Surplus food will either become waste or be captured for use, depending on how it is valued and managed.[15,16] Surplus fresh foods are at greatest risk of going to waste given their perishability and the limited availability of adequate storage facilities (e.g. cool stores), especially during peak seasons.[17-19]

A major driver of surplus food is a mismatch between supply and demand. This can be a simple case of 'too much food' but is typically more nuanced. For example, food may be supplied in the wrong place, at the wrong time, in the wrong form, or at the wrong price. Surplus food results from systemic, technical, cultural, social, and exogenous factors, as well as a social and political context that enables surplus food, and is a current feature of food systems in Aotearoa and globally.[19,20] Drivers of surplus food are highlighted below. Further analysis of the drivers of surplus food and overproduction, as well as an exploration of root-cause solutions, will be explored in subsequent reports.

Surplus food will either become waste or be captured for use, depending on how it is valued and managed.

As the OPMCSA food waste project progresses, we will continue to seek data on food waste in Aotearoa, and in our final summary report will produce a map detailing our best estimates of food waste volumes at different stages of the food system, including utilised and un-utilised surplus food. If you have data that may support this kaupapa in 2022/23, please contact info@pmcsa.ac.nz

Forecasting demand is hard

It is challenging to work out the right amount of food to produce or stock. This applies throughout the food supply chain and can lead to surplus. For example:

- Aligning demand from farm to store is difficult, not least because of the different time scales actors in the supply chain operate on and the different factors considered when making forecasts. Primary producers often plan production months or years ahead of crop maturity, manufacturers plan months ahead, retailers plan weeks ahead, and consumers often making decisions day-to-day. This means that production decisions are made ahead of consumer demand signals.[19,21]
- Teller et al. (2018) explored the root causes of food waste in the retail sector, with their research highlighting the challenge of "properly matching highly fluctuating demand with supply through accurate forecasting, ordering, and replenishment."[22] This is exacerbated in the context of market competition, where food businesses compete for market share.
- Even small fluctuations in consumer demand, which are often driven by retail-level promotions that drive changes in consumer behaviour, can misguide upstream supply chain actors who are one or more steps removed from consumers, with amplifying ripple effects that can lead to surplus. This is known as the bullwhip effect.[23]
- Commenting on the production stage of the supply chain, the World Wildlife Fund (WWF) observed that "current market practices keep farmers at a distance from their end markets where brokers and intermediaries operate. The lack of direct connection may cause

farmers to misjudge the demand for commodities and the timing of harvest," creating surplus.[19,24] Producing for export adds further complexity and distance from the end consumer. Where surplus volumes are significant, this can drive down the price of food and may mean it isn't commercially viable to harvest, process, and distribute the food, causing it to be left in the field or dumped.[18,25]

- In the Food Waste Reduction Roadmap produced following the first New Zealand Food Waste Summit, Croad and Vincent (2021) observed that processors and manufacturers are often so busy with the business of making food that demand forecasting falls to the wayside, leading to overordering of raw materials and overproduction of end products.[26] This challenge doesn't occur in isolation; the challenge of demand forecasting would be lessened in an environment with smoother demand signals.
- Consumer preferences can change suddenly and at scale as the result of health, environmental, or other trends. For example, well-publicised research looking at the health impacts of cholesterol in eggs and trans fats in margarine contributed to these products falling out of favour,[27,28] while trends in vegetarianism and veganism, respectively, have scope to boost demand for these goods. While likely easier to forecast and manage than rapidly fluctuating demand, these longer-term trends have a role to play in surplus.
- For restaurants and cafés in Aotearoa that offer cabinet food, unsold food accounts for 30% of food preparation waste,[29] attributable at least in part to the difficulty of forecasting fluctuating demand.[26] While we don't know how much catering waste is produced in Aotearoa, it's likely that demand forecasting is a particular challenge here too.
- New food products or flavours might not be as successful as anticipated, leading to unsold stock that's hard to move.[30]
- Ka Ora, Ka Ako, the Ministry of Education (MoE) healthy school lunches programme, serves around 220,000 lunches a day across 947 schools and kura. The ongoing COVID-19 pandemic and increased winter illnesses have contributed to higher school absences, impacting demand forecasting.[31] A failure to match children's food preferences also plays a role.[32] MoE is currently prioritising efforts to reduce surplus lunches through supplier relationships and demand forecasting.[31]
- Even individual consumers, who are best placed to understand their own food demands, get it wrong, which is evident in household food waste volumes.[33]

Overproduction can be used to buffer against losses or meet perceived consumer expectations

As well as stemming from the challenges inherent in demand forecasting, overproduction can be planned or systemic. For example:

- To buffer against unpredictable weather patterns, extreme weather events, and other hard-to-anticipate factors that impact productivity, surplus is designed into food production systems.[24,34] With global warming driving up the incidence of extreme weather events,[35] buffering against crop losses resulting from these events may increase.
- A focus on the production of premium produce is closely linked to surplus food generation. Rising global and local cosmetic standards for fresh produce, which are at least partially attributable to often arbitrary supermarket standards, drive systemic overproduction and waste.[19] To remain profitable, producers focus on increasing volumes of high grade produce, with less attention paid to the market's willingness to absorb lower grades of produce, which may build up in excess of demand.[18,25,26] An interview-based study found that New Zealand consumer's cosmetic expectations for fresh fruit are "very high."[5]

Overstocking is practiced to mitigate the risk of stockouts

As with overproduction, overstocking in the retail and food service space can be deliberate.

- Interviews with staff at Countdown, New World, and Pak'nSave, and feedback from stakeholders, identified that supermarkets strive to keep shelves continually well-stocked to meet consumer expectations, which can lead to stock being carried in excess of demand.[5,36] Underscoring this point is the prevalence of baked goods in New Zealand's retail and food service food waste mix.[5,29]
- Partially empty shelves can also cause customer dissatisfaction or lead to panic buying,[37] so keeping shelves full can be seen as a response to this risk.
- A US study highlighted customer's expectations for "food quality, freshness, product choice (in terms of width and depth of the product range), and in-store availability" as constraints that impact stock management practices and can ultimately contribute to food waste.[18]
- For certain food products where profit margins are large, it arguably makes commercial sense to produce or stock in excess because losing out on sales by undersupplying costs businesses more than having unsold surplus.[26,29] For some products, such as butchered meat, high profit margins may reflect the costs of providing these foods and arguably compensate for food waste. Accurate demand forecasting is crucial to reduce waste, a topic which will be covered in a subsequent report.

Perceived consumer demand for abundance, quality, and variety is often used to explain overproduction and overstocking. However, these consumer demands are highly unlikely to be fixed and, if continually reinforced through food systems practices, will become self-fufilling.[5,19,38-42] The relationship between consumer expectations and food waste will be explored in a subsequent report.

Perceived consumer demand for abundance, quality, and variety is often used to explain overproduction and overstocking.

Mistakes happen

Surplus food can eventuate from mistakes during food processing, manufacturing and packaging that cause food products to be judged by producers or retailers, or deemed by New Zealand's food laws, as being unsuitable for market.[16,43] For example, ingredients may be inadvertently left out during manufacturing (e.g. chicken left out of a chicken risotto ready meal) or labels or packaging may be printed incorrectly (e.g. allergens not bolded, wrong flavour on packet, nutritional information or date label misprinted). Repackaging or remanufacturing products for sale in the primary market can be technically unviable or cost prohibitive, typically only viable for high-value products.[44] Trial batches of new food products or processes that don't meet intended product specifications can also lead to food being deemed unsuitable for sale.[30]

Exogenous shocks can lead to surplus

Unexpected events that lead to reduced demand or impact the ability to harvest, process, distribute, and sell food can lead to the accumulation of surplus.[45] The COVID-19 pandemic provides a recent example of this (see case study 1), but is just one kind of exogenous shock that can contribute to surplus food. Others include geopolitical events such as Russia's invasion of Ukraine, causing some exporters to withdraw from the market, leading to food products in limbo,[46] and extreme weather events causing domestic distribution networks to be compromised.[47]

Case study 1: Surplus in the context of COVID-19

COVID-19 is an example of an exogenous shock that led to food surplus, particularly in the initial months of the pandemic.[45] Worker illnesses, border restrictions, and lockdowns in Aotearoa and abroad disrupted labour, reduced distribution capacity, led to food service and some retail closures, and affected demand patterns.[45,48-50]

Pigs

A prominent example of this occurred in the New Zealand pork industry. With pigs unable to be processed at the anticipated rate due to butcher and food service closures during level 3 and 4 lockdowns at the start of 2020, surplus pigs accumulated on farms. Normally supplied to the market on a weekly basis due to their rapid growth rates, this led to a looming animal welfare crisis, prompting the government to agree to purchase up to 2,000 pigs per week and redistribute the meat to people in need.[51,52] The funding for this intervention came from a $15 m appropriation under the COVID-19 Response and Recovery Fund that enabled the MPI to purchase products where significant food waste, animal welfare, biosecurity concerns or environmental concerns would otherwise result.[53]

Produce

In Central Otago nearly 2,700 tonnes of apples went unharvested, with COVID-related labour shortages as a major driver.[18] For harvested produce, the closure of small retailers, farmers markets, and hospitality businesses during lockdowns (which MPI was advised are responsible for the distribution of approximately 60% of fruit and vegetables for the domestic market) meant that many growers couldn't readily sell their products, resulting in surplus.[52,54]

Flour

Across Aotearoa, retail shortages of flour were experienced, leading to rationing in grocery stores. This wasn't due to a shortage of flour in the country – with the closure of food service businesses, large bags of flour were present in excess of demand. However, these large bags of flour couldn't easily be converted to lot sizes suitable for the retail channel, representing a more nuanced form of supply-demand mismatch.[45,55]

Export markets

Demand for New Zealand exports was also affected by COVID-19. For example, red meat distribution became more difficult in China, reducing demand for our products.[47] Finding alternative markets in the context of a global perturbation is difficult. In addition, products often have different packaging, labelling, or specifications depending on the market they are intended for, so where export orders are cancelled abruptly, this can create an additional challenge.[19,30]

Surplus food can be found in unexpected places, depending on how you define it

Fisheries by-catch, parts of food that are considered waste by some and food by others (e.g. fish heads), and animals culled during wild animal management and control operations could be considered to be surplus. Such surplus can, in some instances, be saved from waste by the food

rescue sector or other interventions. For example, fisheries by-catch is sometimes eaten onboard or used as bait,[56] social organisation Kai Ika redistributes fish frames and heads from recreational fishers who don't eat them to communities who do,[57] and wild animals from management and control operations are sometimes recovered for consumption – for example, for export,[58] distribution to food banks,[59] or use in food products such as Burger Fuel's recent venison burger.[60]

The length and structure of supply chains impacts surplus volumes too

Prior to the COVID-19 pandemic, food systems had been evolving from being locally and regionally based towards increasing global connectivity and length, with a focus on cost performance and efficiency,[45] and a tendency in food retailing towards low stocks and continuous product flows.[49] This globalised, just-in-time approach to food supply chains (and supply chains more generally) is increasingly being questioned as a result of the vulnerabilities exposed by COVID-19, and a shift to just-in-case supply chain management is occurring.[48,61]

Supply chain length, connectivity to end users, and the balance between just-in-time and just-in-case food supply and stock management have impacts not just on supply chain resilience but also food waste and surplus. For example, if we shift towards shorter, localised food supply chains in response to lessons from the pandemic, producers will likely be better connected to markets so theoretically more able to forecast demand[24] and will be less restricted by cosmetic standards enforced by food retailers.[62] However, production may become less efficient, leading to greater waste of food during production, for example due to attempts to grow crops in places that are ill-suited. Additionally, trends towards holding larger inventories may lead to greater food waste that would require careful stock management and rotation to mitigate. These themes will be explored in more detail in subsequent reports.

… trends towards holding larger inventories may lead to greater food waste that would require careful stock management and rotation to mitigate.

1.4 Food insecurity is caused by poverty and its harms ripple widely

Food insecurity forms a crucial part of the context in which the food rescue sector operates. The most recent government data on food insecurity found 12.0% of children live in households where food runs out sometimes and 2.9% live in households where food runs out often.[63] This section gives a brief overview of food insecurity in Aotearoa and how it relates to food rescue. Recommendations and analysis of solutions relating to root-cause solutions to food insecurity are beyond the scope of the OPMCSA project and point to social issues that can't be solved within the confines of our food waste project.

We're not short of food, and yet food insecurity is very real in Aotearoa

Aotearoa is a food producing nation, with 52% of New Zealand's land mass used for food production in 2020.[64] In 2021, we exported food and drink worth $31.2 billion.[65] We export around 90% of our dairy, beef, and lamb.[66] In 2017, KPMG reported that we grow enough food for 40 million people.[67] A 2020 study combining nutritional guidelines and export data found that, between 2016 and 2018, Aotearoa exported enough servings of dairy to meet the recommended dairy intake of 39 million people each year, enough meat, seafood and other protein for 11.5 million people, enough vegetables for 2 million people, and enough fruit for 10 million people.[68] Based on total energy, we export over four times the amount of food it would take to feed the country.[68] Despite being a country that produces far more food than it consumes, many people face food insecurity.

Describing this paradox in the New Zealand and Australian context, Healy et al. (2020) wrote:

> "There has never been an actual lack of food in either countries [sic] in recent years, with both nations producing a substantial amount of food surplus that is exported, redistributed or wasted. However, in both nations there has been a lack of access to affordable, healthy and culturally appropriate food…"[69]

Food security means access to sufficient, safe and nutritious food on your own terms

Food insecurity, food security, and food sovereignty have specific meanings and relationships to food rescue. Food rescue can contribute to alleviation of the hunger associated with food insecurity but on its own doesn't combat food insecurity or create food security or food sovereignty, based on commonly used definitions (see glossary).

However, the food rescue sector is often connected to a wider network of other initiatives that can promote food security. For example, food rescue organisations may incorporate community gardens and cooking classes into their work or link food recipients up with wrap around social services. While the rescued food itself is a short-term solution, the relational networks that form around food rescue often move beyond short-term actions and can be part of a network of projects which help foster food security and build community.

… the food rescue sector is often connected to a wider network of other initiatives that can promote food security.

Food sovereignty is a concept closely related to food security, which is relevant to all New Zealanders but has been highlighted as having particular significance for Māori. Food sovereignty centres control of food within local communities, which for Māori must include access to whenua, traditional food, and associated systems.[70] Moeke-Pickering et al. (2015) describe Māori food sovereignty as "recentring 'Māori healthy kai' as a vital part of the tikanga, culture and whānau."[70] Colonisation, confiscation, sale and loss of land, urbanisation, environmental degradation, and a food system that subverts traditional principles have consistently undermined Māori food sovereignty.[70] In spite of this, place-based kaupapa Māori research demonstrates that Māori whānau maintain a connection to traditional ways of producing, preparing and gathering food, and a desire to learn more and enact traditional food provisioning practices.[70]

Related to food security and food sovereignty, the right to adequate food was recognised in the 1948 Universal Declaration of Human Rights and enshrined in the 1966 International Covenant on Economic, Social, and Cultural Rights, which Aotearoa has ratified.[71,72] When benchmarking New Zealand's 2019 prevalence of food insecurity to per-capita income, the Human Rights Measurement Initiative rates New Zealand's performance in its fulfilment of the right to food at 82.5%, well below many of the best performing high income countries.[73,b]

[b] NB: This comparison uses Food Insecurity Experience Scale data collected through the Gallup World Poll, which has a smaller sample size than other nationally representative surveys in New Zealand. As a result, this means that the estimates are subject to larger confidence intervals.

Inadequate income is the core driver of food insecurity, and the burden falls unevenly

Inadequate income is a key driver of food insecurity. A 2010 regression analysis investigating the association of demographic and socioeconomic factors with food insecurity found that household income was the strongest predictor of food insecurity,[74] a finding that continues to be supported with more recent research.[11,75,76] Specifically, Carter et al. (2010) found that those in the lowest quintile for household income were four times as likely to be food insecure when compared with the highest quintile of earners.[74] A 2018 survey undertaken by Auckland City Mission found that the most common aspiration of people experiencing food insecurity was stable and fulfilling employment.[77]

Inadequate income is a key driver of food insecurity.

People on limited incomes often meet fixed costs first, like expenses relating to housing, utilities, transport, or debt, before spending what is left on food.[11] Such limited food budgets are vulnerable to unexpected expenses, sudden shocks, and changing costs,[11,78] the latter being particularly prominent at present given the high cost of living.[79] Debt, housing, utilities, health, disability, and transport all contribute to food insecurity by impacting people's ability to earn or eating into their incomes (see figure 4).[76,80-83] A 2020 research project found that many food relief organisation leaders in Wellington identified high housing costs as the primary cause of income-related food insecurity.[83] People receiving a social security benefit are some of the most vulnerable due to the limited income provided,[84] as are people with disabilities, who are more likely to experience income inadequacy than people without disabilities.[85]

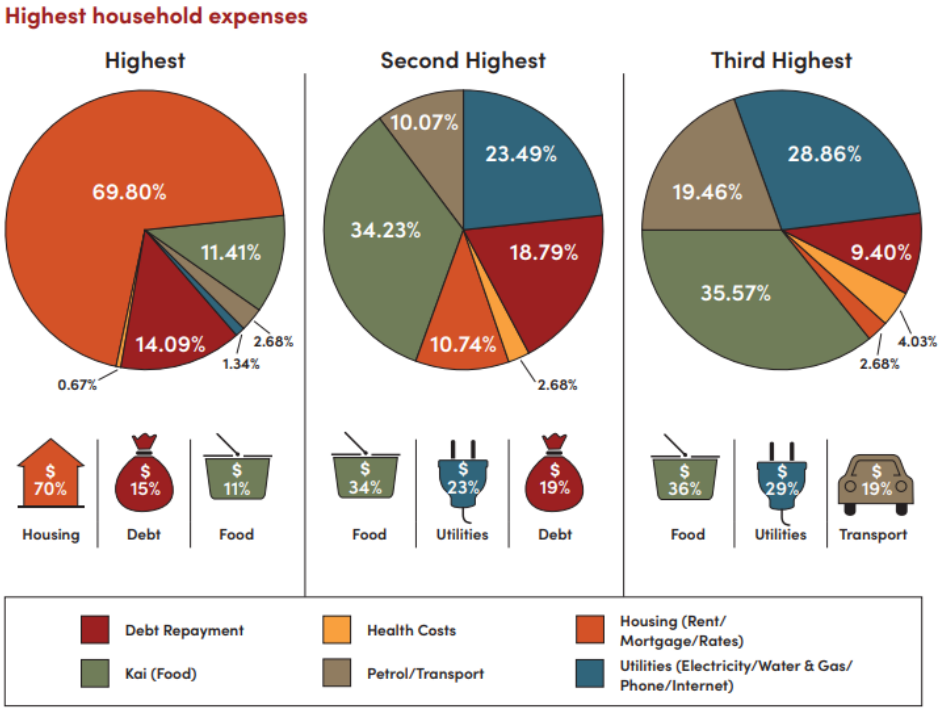

Figure 4: Results from a survey of 149 people who recently accessed community food support, showing the first, second, and third most costly expenses for people experiencing food insecurity. Image credit: Kore Hiakai.[11]

Māori and Pacific households are more likely to face insecurity, in large part due to being more likely to have a low household income,[63,70,86,87] although other socio-cultural factors play a role.[86] Larger household sizes and systematic barriers that continue to undermine cultural practices of food

security and food sovereignty also contribute.[70] Robinson (2019) collected data from over 600 people accessing Auckland City Mission's foodbank services, and found an overrepresentation of women, Māori and Pacific peoples, people raising children, and those on a social security benefit.[84]

When a person or household is experiencing food insecurity, the weekly budget doesn't add up – even with a tight budget there is simply not enough money to get sufficient nutritious food. People experiencing food insecurity may go hungry or seek external support such as food parcels or Special Needs Grants to get though the week (see glossary).[88,89] With regards to Special Needs Grants, income limits apply, as well as limits to how much support can be accessed in a six month period – although exemptions can apply depending on the circumstances.[90-92] Where people are accessing Special Needs Grants for food regularly, Work and Income may refer the person through to budgeting services, or conduct a more thorough review of their circumstances to understand the drivers of their situation, with a view to identifying more complex issues that could be addressed, beyond immediate food support.[93]

Kore Hiakai was established by a group of social services in 2018, with the Ministry of Social Development (MSD) providing funding in late 2019. Kore Hiakai represents a group of social service organisations that advocate for the elimination of food insecurity in Aotearoa.[94] While previously working in the food rescue space, Kore Hiakai now focuses on the underlying drivers of food insecurity and realising a food secure Aotearoa.

People experiencing food insecurity are forced to stretch the budget and ration food

People experiencing food insecurity try to stretch their budgets to purchase as much food as possible, often relying on food that is cheap, nutrient poor, and calorie dense; this helps to fill bellies, but doesn't always meet nutritional needs.[76,81] This reality is described by Dr Rebekah Graham (2019) as follows:

> "Pragmatic responses to feeding hungry bellies means that people's diets, particularly parents, risk being constructed as nutritionally inadequate. However, when all you have is NZ$25 for food for the week, purchasing food that will last is crucial."[76]

As well as efforts to stretch the budget, the following practices have been reported by people experiencing food insecurity in Aotearoa: rationing food so it lasts for the week; skipping meals or even having one meal a day; parents forgoing food so that children can eat; consistently eating sub-standard food; and taking sleeping pills instead of eating.[76,89]

Food insecurity is bad for health, wellbeing, and education, and can be intergenerational

The impact of food insecurity is substantive, multifaceted, and can last a lifetime – or even intergenerationally. Food insecurity contributes to poor physical and mental health.[10,70,76,88,95-97] In 2022, Kore Hiakai conducted a survey of people who recently accessed support from a social service agency in Aotearoa. 89% of respondents reported that their lack of income and/or food was affecting their or their family's physical health some or all of the time, and 90% reported the same in relation to mental health.[11] Based on 2015/16 survey results about

89% of respondents reported that their lack of income and/or food was affecting their or their family's physical health some or all of the time, and 90% reported the same in relation to mental health.

food insecurity in households with children in Aotearoa, the Ministry of Health (MoH) found that:

> "Children in food-insecure households had poorer parent-rated health status, poorer nutrition, higher rates of overweight or obesity, asthma and behavioural or developmental difficulties, and experienced a range of other adverse circumstances. Parents of children in food-insecure households reported higher rates of psychological and parenting stress, as well as poorer self-rated health."[86]

Food insecurity creates a double burden of malnutrition and obesity, which can have lasting health impacts, especially for children.[76,81,98,99] The health impacts of food insecurity start early in life, with energy and nutrient intake during pregnancy being important for a baby's health,[100] and with food insecure breastfeeding mothers sometimes being unable to produce enough breastmilk to feed their babies.[76] Animal models of undernutrition during pregnancy have provided evidence for the multiple potential mechanisms underpinning the role of maternal nutrition in lifelong offspring health.[101]

Food insecurity can cause high levels of stress and distress.[76,89,96,102] In addition, people may opt out of important social occasions if they don't have food to contribute, causing isolation. This is particularly important for many Māori and Pacific peoples, where sharing food is a culturally significant practice.[70,76,89]

The stigma associated with being food insecure may also compromise mental health. Elgar et al. (2021) studied data on food insecurity and mental wellbeing from 160 countries and found that relative food insecurity was associated with worse mental health, lower wellbeing, and lower life satisfaction, leading them to conclude that:

> "…individuals who live with constant worries about not getting enough food, have to skip meals, or face chronic hunger are deprived of material and social resources that support mental health and wellbeing, especially in settings where food insecurity is less common and potentially more stigmatised."[97]

A 2017 Canadian study looking at the relationship between food insecurity and mental health found a dose-response relationship: the more severe the food insecurity, the more likely adult respondents were to report adverse mental health outcomes across six indicators (see figure 5). While causality wasn't established and poor mental health is likely to be both a contributor to and an outcome of food insecurity, this study highlights that food insecurity and its health impacts are complex.[103]

In addition, food insecurity can contribute to developmental and behavioural issues which impact on educational outcomes, with children experiencing food insecurity having lower school grades.[76] Completing homework and engaging in classroom activities can be hard without adequate nutrition.[89] Children experiencing food insecurity also have lower attendance rates,[76] with one of the contributing factors being a decision to keep kids at home to avoid the shame of sending them to school without lunch,[89] although the MoE school lunches programme has likely at least partially mitigated this factor. With educational attainment being a strong predictor of employment and income level,[104] this can have flow on effects throughout a person's life, with scope to contribute to intergenerational poverty and food insecurity. Beyond the individual, these health impacts contribute to pressure on the nation's health systems and contribute to lost economic productivity.

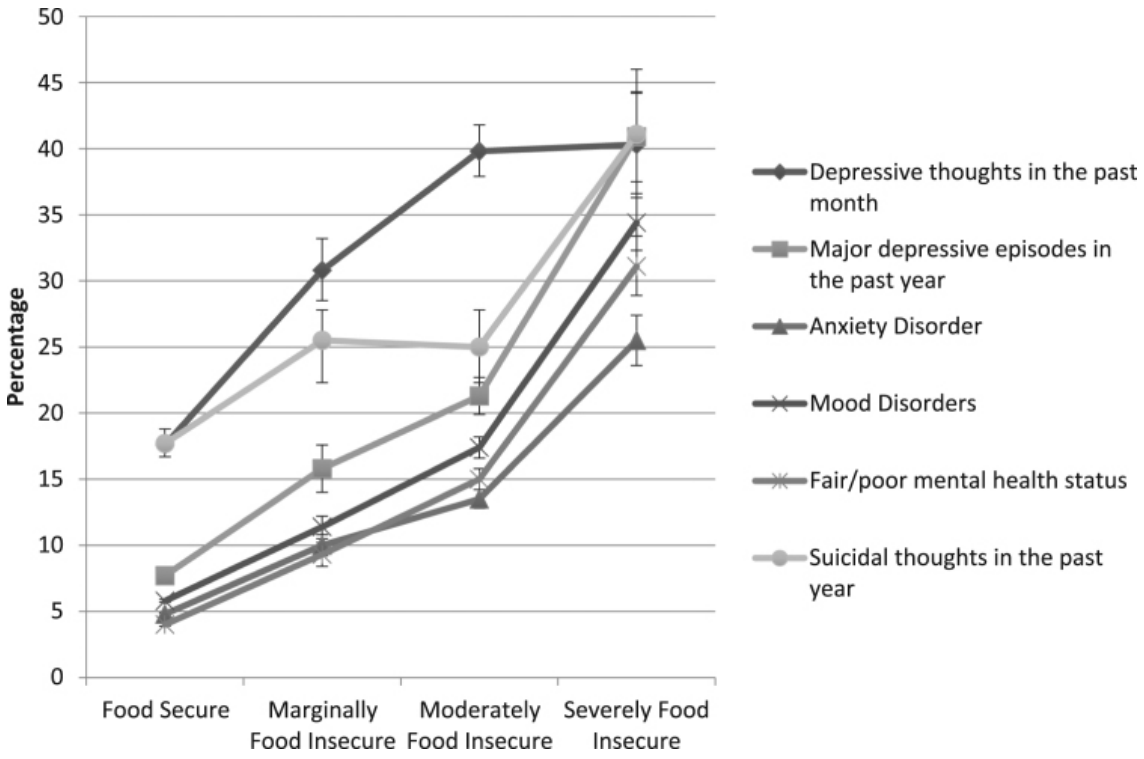

Figure 5: Percentage of surveyed Canadian adults reporting adverse mental health outcomes across six indicators, with respondents categorised according to the level of food security or insecurity experienced. Bars are 95% confidence intervals. Image credit: Jessiman-Perreault and McIntyre[103]

Data on food insecurity could be strengthened

There are gaps in food insecurity data in Aotearoa, which make quantifying the scale, depth, and complexities of food insecurity in Aotearoa difficult. Data inadequacies also impede the development of targeted solutions, both in terms of meeting acute needs for food and addressing the root causes of food insecurity.

There are gaps in food insecurity data in Aotearoa, which make quantifying the scale, depth, and complexities of food insecurity in Aotearoa difficult.

The main source of data on food insecurity is the New Zealand Health Survey (NZHS), run by MoH. The NZHS is an annual, nationally representative household survey. Data is collected on a range of core health indicators, and each year different additional modules are included to provide data on topic areas of importance to health and wellbeing in Aotearoa. One of the modules is on food security, with survey participants asked to respond to questions about:[86]

- being able to afford to eat properly
- food running out in the household due to lack of money (see figure 6)
- eating less because of lack of money (see figure 6)
- eating a lower variety of foods because of lack of money
- relying on others to provide food and/or money for food
- making use of food grants or food banks when there was not enough money for food (see figure 6)
- feeling stressed because of not having enough money for food
- feeling stressed because of not being able to provide the food wanted for social occasions.

The food security module has been included in the NZHS for children six times in the last decade (see figure 6), including in the 2021/22 survey (with the results, which will be influenced by the COVID-19 experience, not yet published). Meanwhile, it has only been included once in the last decade for adults. Since 2019/20, the food security module has been a core module in the NZHS for children.

Based on NZHS data, childhood food insecurity has been trending down over the last decade. A 2019 MoH report analysing the results from the 2012/13, 2014/15, and 2015/16 food security module responses for households with children additionally developed and reported on a food security index, combining and weighting responses across the eight questions.[86] By that summary index, it was found that 19% of children were living in households experiencing moderate-to-severe food insecurity and 1.6% of children were living in households experiencing severe food insecurity in 2015/16. Applying the food security index methodology to more recent NZHS data, MoH has calculated that in 2020/21, 13.4% of children were in the moderate-to-severe food group, and 1.5% of children in the severe group.[93]

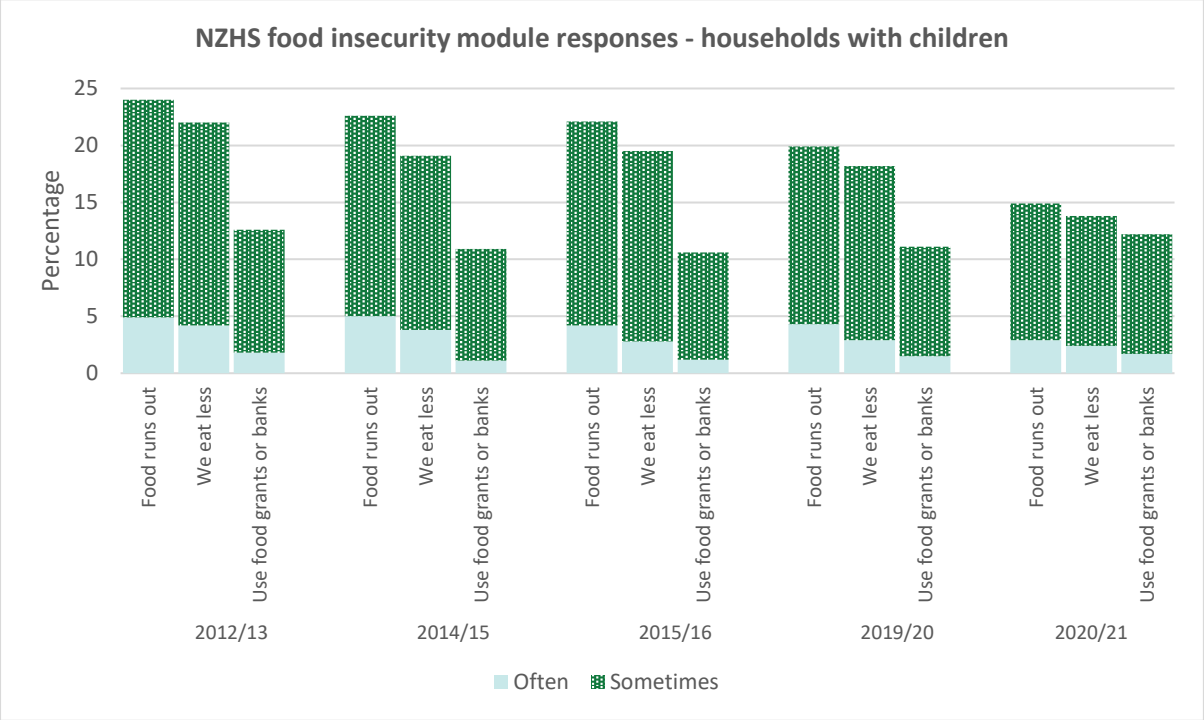

Figure 6: Bar graph showing percentage of respondents answering sometimes or often to three questions in the NZHS food security module. For each question, the primary caregiver in a household with children responded to a statement relating to their household's experience of food security in the last 12 months. Responses to three of the eight questions in the food security module are currently available for all the years in which the module has been run (excluding 2021/22 NZHS results, with the NZHS results not yet published), so are presented in the graph above. Full details of food security module questions can be found in *Household food insecurity among children in New Zealand* (2019).[86] Data sourced from: NZHS data explorer portal.[63]

While not as nuanced as the food security summary index, the percentage of children and young people living in households where food runs out sometimes or often is sometimes used as a proxy measure for the prevalence of food insecurity.[105] The 2020/21 NZHS showed that 12% of children were living in households that reported running out of food sometimes and 2.9% were living in households that reported running out of food often.[63] This was an improvement from the 2019/20 survey, where 15.6% of children were living in households that reported running out of food sometimes and 4.3% of children were living in households that reported running out of food often. In the 2020/21 survey, Māori children were almost 2.5 times more likely than non-Māori children to

live in a household where food ran out sometimes or often, while Pacific children were more than 3.2 times more likely.[63] Children who lived in the most socioeconomically deprived areas were more than six times more likely to experience food running out sometimes or often than those living in the least deprived areas.[63]

Understanding geographic variation in the experience of food insecurity can support the strategic design and distribution of community food support initiatives.[106] To provide region-specific data, MoH pools survey results from three consecutive years of research. Pooling is required to boost the sample size, enabling granular data to be provided by region and sub-population groups.[107] Household food security questions for families with children have been included in the NZHS since 2019/20, so once the 2021/22 results are available, MoH will be able to present regional outputs on food security.

Understanding geographic variation in the experience of food insecurity can support the strategic design and distribution of community food support initiatives.

The NZHS, while giving some indication of food insecurity, has limitations:

- Adults living in households without children have only been asked questions regarding food security once in the last decade as part of the NZHS.[108] This weakens our ability to understand the food security status of households without children, and also misses people who are unhoused or living in institutions (e.g. prisons, long-term hospital care).
- Surveys are only as good as the questions asked and responses given. The shame and stigma associated with food insecurity may lead to underreporting.[89,106]
- The NZHS covers a raft of health indicators, limiting the depth of insight into nutrition and food provisioning practices, and therefore food insecurity. The last MoH survey separate from the NZHS and focussed solely on adult nutrition was in 2008/09 while the last survey focussed on children's nutrition was conducted in 2002,[109] although dietary habits modules have been included in the NZHS for both adults and children in recent years.[63,108] MoH has contracted the University of Auckland's National Institute for Health Innovation to scope a national nutrition survey, although the funding for the survey itself has yet to be secured.[110,111] The survey could help provide up-to-date, comprehensive data on nutrition and food insecurity in Aotearoa. In addition, the 2023 edition of MSD's report on child poverty in Aotearoa will have a section on food security, another opportunity for more nuanced data and analysis on this theme.[112]
- The NZHS data doesn't enable us to readily disentangle chronic food insecurity from temporary food insecurity. While this distinction may not be material for understanding the level of demand for food support, it has significant implications for root-cause solutions to food insecurity.
- International approaches to reporting on food insecurity vary, making comparisons between countries using official government statistics difficult.[113] The Food and Agricultural Organisation of the United Nations (FAO) has developed a food security assessment method known as the Food Insecurity Experience Scale (FIES), which it uses to track progress towards Sustainable Development Goal 2.1 on ending hunger and achieving food insecurity. Because the FIES isn't universally applied, FAO applies the FIES to survey data collected by Gallop, yielding results which are in some cases vastly discrepant with national estimates of food insecurity.[113]

Beyond government-collected data on food insecurity and FAO's FIES data, there are other measures which have been used by both the social service sector and in the academic literature as indicators of food insecurity, but these too have limitations.

- Food parcels and Special Needs Grants from MSD increased over the COVID-19 lockdown periods. Immediately prior to lockdown, MSD made roughly 30,000 Special Needs Grants per week, rising to a peak of 72,000 for the week ending 10 April 2020.[114] This data has been used as an indication of worsening food insecurity during and post COVID-19 lockdowns.[11,115] Even prior to that, the number of MSD Special Needs Grants used for food was trending upwards, tripling between December 2014 and December 2019.[83] Similarly, increased demand reported by food providing organisations adds to this picture[52,116] (see section 2.2). However, these trends don't capture changes to government policy, visibility and awareness of support pathways, and changing attitudes towards receiving help.[114] Beyond this, these measures only capture those who seek help through formal channels.
- Income compared with the cost of living has been used as a proxy measure for food insecurity,[117] but is unable to provide granularity about the experience of food insecurity, and rests on a series of assumptions about how people spend their income (e.g. starting with fixed expenses before food) and access food (e.g. assumes that food is mostly purchased, rather than caught, grown or shared).[52]

1.5 The rescue sector wouldn't be required in an ideal food system

Some argue that food rescue enables the perpetuation of structural conditions that produce food waste and food insecurity,[15] distracting from root cause solutions.[69,118] Solutions for surplus food are viewed as socially and environmentally positive in the short term (see section 1.1 and section 3), but must not diminish the focus on combatting surplus food at source[119] or rethinking our food systems.[34] In addition, food rescue is not a substitute for the welfare state.[1,120,121] Policies relating to food rescue therefore need to be made in tandem with interventions that seek to tackle the root causes of food waste and food insecurity, emphasising that food rescue is an 'in the meantime' solution.[1]

How long is 'the meantime' and what comes next?

Food rescue in its current form relies on the co-existence of surplus food and food insecurity. As efforts to tackle these problems at their roots unfold, the operating environment will change. It's unlikely that food insecurity or surplus food will be completely solved in the near future, and unlikely that progress towards both of these goals will occur at the same pace.

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If progress on prevention of surplus food unfolds more rapidly than work to combat food insecurity, the food requirements of food insecure communities will need to be met with other sources of food. For example, the networks of rescue organisations could be leveraged to distribute purchased food rather than relying primarily on surplus. This occurred in response to COVID-19, with the rescue sector distributing both surplus and purchased food – with purchased food continuing to supplement the food distributed by the rescue sector today (e.g. see figure 8). In addition, some social sector charities have started purchasing fresh produce rather than relying on rescued food in order to secure more reliable access to fruit and vegetables.[117] Partnerships like this could become more common if a significant reduction in the availability of

surplus food occurs. However, the cost of purchasing food is far greater than the cost of funding food rescue. A 2015 study found that food rescue is cheaper than direct purchasing, with every dollar invested in food rescue enabling US$5.71 worth of food to be rescued.[2] While there is much that can be done to prevent surplus food at source – a topic that will be addressed in a subsequent report – some level of surplus is likely to always exist in the food system, particularly in relation to exogenous shocks (see section 1.3 and case study 1). This means there is scope for an enduring role for food rescue even as surplus prevention efforts take effect, but potentially in a reduced capacity and with greater stochasticity. There is also an opportunity for the food rescue sector's networks, skills, and infrastructure to become an enduring part of the country's emergency management response and recovery system (see section 2.2 and case study 7).

… the cost of purchasing food is far greater than the cost of funding food rescue.

Alternatively, demand for food assistance could drop significantly while surplus food persists, either due to a reduction in food insecurity or provision of food by other means. In this event, we could see an increase in the number of food rescue organisations treating surplus food not just as a resource to support food insecure communities, but as a resource for the wider community, for example, through social enterprise models or share economies.[117] This would offer the same environmental benefit by ensuring that surplus food was utilised. There are current food rescue models – including Everybody Eats, Perfectly Imperfect, and Rescued Kitchen – where surplus food is already treated in this way. In the face of this long-term uncertainty, investments in the rescue sector need to be coupled with periodic reviews of the changing food security and surplus food contexts in which the sector operates.

2. The food rescue sector in Aotearoa

2.1 The rescue sector began from the grassroots

The practice of rescuing surplus food predates the existence of formal food rescue organisations, with its roots in both foodbanks and the freegan movement. New Zealand's foodbanks have long accepted donations of surplus food. While not on the same scale as food rescue seen today, there was some level of food rescue occurring before the sector officially started operating in Aotearoa.[122] While foodbanks arose to meet the needs of people experiencing food insecurity, the freegan movement emerged as a reaction against the waste of food fit for human consumption. Freegans seek to help the environment by reducing waste, including by taking edible food from dumpsters for consumption and redistribution.[123] The freegan movement highlighted the issue of food waste and has helped to inspire parts of the food rescue sector in Aotearoa.

Food rescue proliferated in other parts of the world before Aotearoa. FareShare, the UK's oldest food redistribution charity, began in 1994, first as part of Crisis in partnership with UK supermarket Sainsbury's, and later becoming their own charity.[124] City Harvest in New York has been operating for 40 years, diverting surplus food to people in need.[125] Australia's OzHarvest was founded in 2004 in response to surplus food going to waste.[126] Kaibosh, New Zealand's first formal food rescue organisation, was established in 2008 (see case study 2). Others emerged over the next few years, including The Wellington Freestore, Just Zilch, Kiwi Community Assistance, and KiwiHarvest (see case study 3). Food rescue organisations have continued to establish over the past decade, formed by people who have identified needs and opportunities in their communities.

Case study 2: Kaibosh origins

Kaibosh was the first formal food rescue organisation in Aotearoa, founded in 2008 by Robyn and George Langlands. When Robyn Langlands was volunteering at Wellington Women's Refuge, the refuge received a call from Wishbone offering their surplus food at the end of the day. Previously Wishbone couldn't find charities with capacity to pick up the food each day after hours. Robyn accepted the food for Wellington Women's Refuge and found that the available food surpassed what the refuge could absorb, so shared the food with Wellington City Mission too. This sparked a thought – if Wishbone had leftover food, surely other cafés, restaurants, and supermarkets would too. Beyond this, Robyn Langlands realised many charities and non-governmental organisations didn't have the capacity to collect the food themselves. Robyn looked to overseas examples including OzHarvest and City Harvest, drawing on international insights to create Kaibosh in 2008.[127]

Case study 3: KiwiHarvest origins

KiwiHarvest was founded soon after Kaibosh, in 2012. The organisation was first established in Dunedin by Deborah Manning, and has since expanded to cover Auckland, Invercargill, and Queenstown.[7] Reflecting on the founding of KiwiHarvest in an interview with *Radio New Zealand*, Deborah Manning highlighted the dual motive held by many who work or volunteer in the rescue sector:

> "I came across an article in the Otago Daily Times that was talking about dumpster diving – about how people were going into dumpsters at the back of supermarkets and other businesses and living off the food that they were throwing away because it was perfectly good to eat. On the same page, [there] was a story about food insecurity and how children were going to school without having had breakfast or they couldn't take a lunch or they were going to bed without having had an evening meal."[128]

2.2 COVID-19 prompted central government to start supporting the sector

COVID-19 exposed and exacerbated food insecurity and surplus food

Prior to the COVID-19 pandemic, the food rescue sector and wider network of community organisations associated with combatting hunger and food insecurity operated largely without central government support, apart from the emerging role of Kore Hiakai and support via the Ministry for the Environment's (MfE) Waste Minimisation Fund (see figure 7 and annex 4).[52,129-131] Territorial authorities from around the country also contributed support and funding to food rescue activities in their regions. Territorial authority contributions continue today – for example, in July this year Dunedin City Council granted $13,000 to KiwiHarvest to help fund the wages of food delivery drivers.[132-134]

COVID-19 elevated the profile and extent of both food insecurity and surplus food.[135] Surplus food, as described in section 1.3 and case study 1, was at risk of going to waste not just in Aotearoa but worldwide, with global media covering stories of "milk thrown away, fresh fruits and vegetables rotting, animals euthanised" as the result of food system disruptions stemming from the massive changes driven by the virus and associated lockdowns.[48]

COVID-19 elevated the profile and extent of both food insecurity and surplus food.

Food insecurity was exacerbated on multiple fronts.[11,52,69] Financial and physical access to food, rather than the overall availability of food, was the main way that COVID-19 contributed to food insecurity.[136] For example: lockdowns complicated or restricted the operation of social services and small food providers meaning people had to change their food provisioning practices; loss of employment or income reduced people's capacity to purchase food; and consumer stockpiling and hoarding behaviour adversely impacted low income people, "who are often constrained to purchasing their immediate food needs, and who did not have stockpiled items when supermarket shelves ran low."[52,114] MoH undertook surveys relating to people's health and wellbeing during the pandemic. In the week of 22 September 2021, when Auckland was in Alert Level 3 and the rest of the country was in Alert Level 2, 8% of respondents reported that they struggled to pay for basic living costs such as food or accommodation, and 2% said they had relied on Special Needs Grants, food banks, or food parcels in the past week because they didn't have enough money for food.[137]

Interviews with people involved in the rescue sector highlighted a significant increase in demand for food from social services: "…for most it was between 300–400% times the usual demand, with some areas/organisations experiencing increases of up to 900%."[52] The 2020/21 annual report published by the Aotearoa Food Rescue Alliance (AFRA, see later in this section and glossary) also highlights increasing demand for rescued food in the face of the pandemic:

> "Since the lockdown started, over 80% of our AFRA member organisations have had an increase in the number of new organisations inquiring about becoming recipients. Additionally, over 95% have experienced an increase in need from their existing recipients."[116]

While some of the increase in demand was likely driven by de-stigmatisation of accessing food support in the face of a crisis,[52] it also likely reflects a genuine increase in need given that the known drivers of food insecurity and hunger were adversely affected by the pandemic.[11,52,69]

COVID-19 prompted a lift in support for the sector, but the next chapter is unwritten

With surplus food and food insecurity concerns exposed and exacerbated in the face of the pandemic, government funding and other support for the rescue sector fast-tracked.[69,138] Discussions had been underway between the rescue sector, government, and philanthropists, but COVID-19 provided the catalyst for action. [69] Central government support for the rescue sector came in multiple forms. The key investments and support following the advent of the COVID-19 pandemic are listed below.

- MSD received $32 m in funding in June 2020 to support food insecure communities over two years, including but not limited to food rescue initiatives. Funding has since been extended, with an extra $18.5 m until June 2023. The funding has been used to support the establishment and operation of the NZFN and AFRA, as well as extending funding for Kore Hiakai, and providing grants to community food providers (see later in this section for more details).[52,69,139-141]
- Funding for food rescue via the Waste Minimisation Fund also significantly increased with the advent of the COVID-19 pandemic (see figure 7). A total of less than a million dollars was allocated to food rescue efforts between 2010 (when the fund opened) and 2019, while the 2020 and 2021 funding rounds saw food rescue organisations collectively attain over a million dollars through the fund.[130,131]
- MPI received around $15 m from the COVID-19 Response and Recovery Fund to redistribute surplus food at risk of going to waste as the result of disrupted markets and distribution channels during the 2020 level 4 lockdown. The initiative involved the establishment of a contingency fund allowing MPI to purchase products where significant food waste, animal welfare, biosecurity, or environmental concerns would otherwise result, redistributing the food to struggling communities.[53] See section 1.3 for more details.
- The Fiordland Wapiti Foundation, Game Animal Council, and the Department of Conservation (DOC) partnered to recover and process 600 culled deer from the Fiordland National Park, providing 18 tonnes of venison mince to people in need via South Island foodbanks.[59,142] See case study 14 for more details.
- While not specifically targeted at the rescue sector, the advent of COVID-19 precipitated a temporary law change that lifted the requirement for businesses donating trading stock to pay income tax on the value of donated goods.[143] The law change is in place until March 2023. See section 5.1 for more details.
- MPI worked with AFRA to develop a food safety guide to empower donors and the rescue sector to operate safely in the New Zealand context.[144] With food safety concerns cited as a

barrier to donation to the rescue sector, this guidance likely had the dual benefit of empowering donors and enhancing the safe operation of the rescue sector. See section 4.4 for more details, and case study 7 for information about the Global FoodBanking Network's role in food safety.

- In the 2021 Waste Minimisation Fund round, MfE dispersed a combined total of $220,012 to two food rescue organisations, covering growth at new sites and new delivery vans.[145]
- In addition, local government food rescue and food security initiatives ramped up, such as the Emergency Food Security Team mobilised by Wellington City Council, and their ongoing support for food rescue.[146,147]

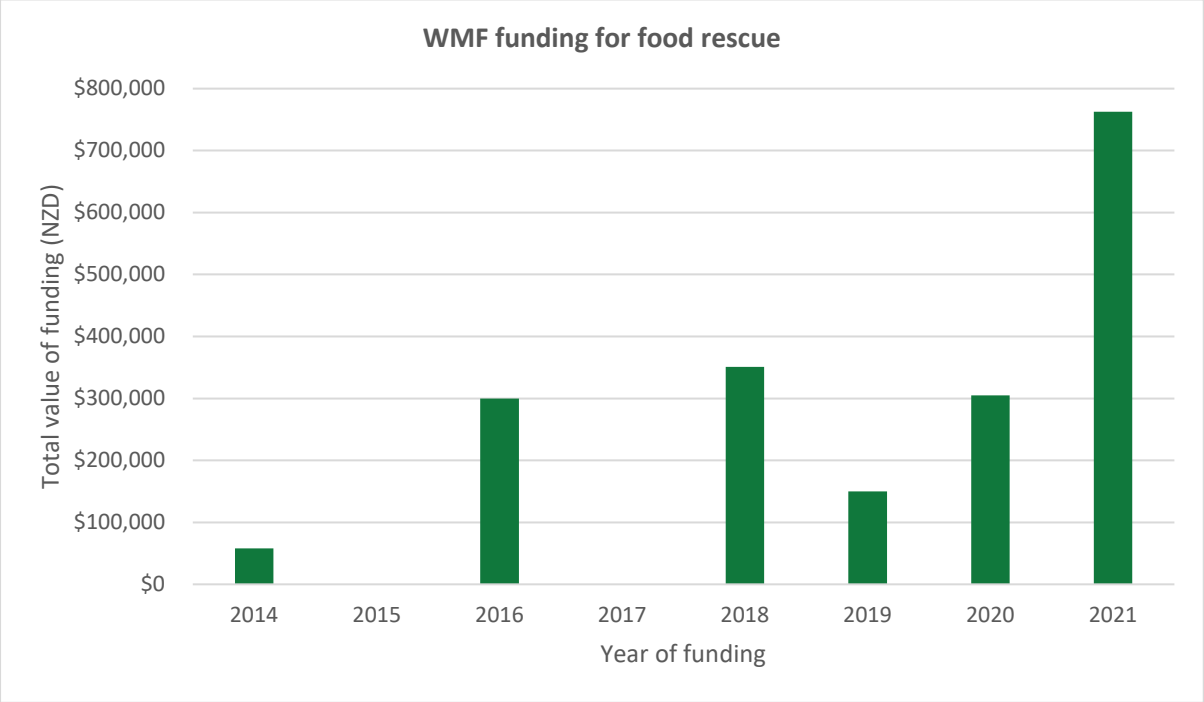

Figure 7: WMF funding for food rescue by year. One food rescue initiative was funded in 2014, 2018, and 2019, 2 initiatives in 2016, 3 in 2020, and 5 in 2021. Abbreviations: WMF = Waste Minimisation Fund, MfE = Ministry for the Environment. Data provided by: MfE and sourced from MfE website.[130,131] See annex 4 for full details of each funded project.

A commonality between all these modes of support is that they are short-lived or unpredictable, and their renewal or continuity isn't assured, creating an uncertain environment for rescue sector stakeholders to operate in. While stood up to address a spike in need at the start of the COVID-19 pandemic, surplus food waste and food insecurity, as described in sections 1.3 and 1.4, are not short-term, pandemic-only phenomena.

A commonality between all these modes of support is that they are short-lived or unpredictable…

MSD's Food Secure Communities programme is currently being reviewed,[140] DOC is exploring options to expand its deer recovery pilot[59] (as well as exploring commercial opportunities)[148] and the Waste Minimisation Fund is currently undergoing a transformation,[149] providing opportunities for agencies to consider how food rescue fits with their strategic priorities and roles. The impacts of the other COVID-related government initiatives, in the context of food insecurity and surplus food issues that extend beyond the pandemic, are also worth reviewing.

NZFN and AFRA are the two main food rescue initiatives funded by central government

New Zealand Food Network

NZFN is a national distributer of bulk surplus and donated food, operating at scale with the goal of enhancing efficiency and equity in the rescue sector.[150] While food rescue organisations typically receive donations from retailers and (to a lesser extent) the food service sector, NZFN receives bulk donations, typically from producers, processors and manufacturers, and wholesalers, with 90 donors currently onboard.[151] NZFN distributes the food it receives to 61 food hubs, usually food rescue organisations, community groups, or foodbanks, which then provide the NZFN food to people in need (see figure 8). These food hubs are selected for their capacity and their ability to pass the food received on to the many other smaller community organisations in a region. NZFN has cool store facilities, a large distribution network, storage capacity, and materials handling equipment (e.g. forklifts) that enable it to handle large volumes of food. Downstream food rescue organisations and other charities would be unable to easily access the rescued food NZFN provides given their limited capacity to work with such substantial volumes.[52,62]

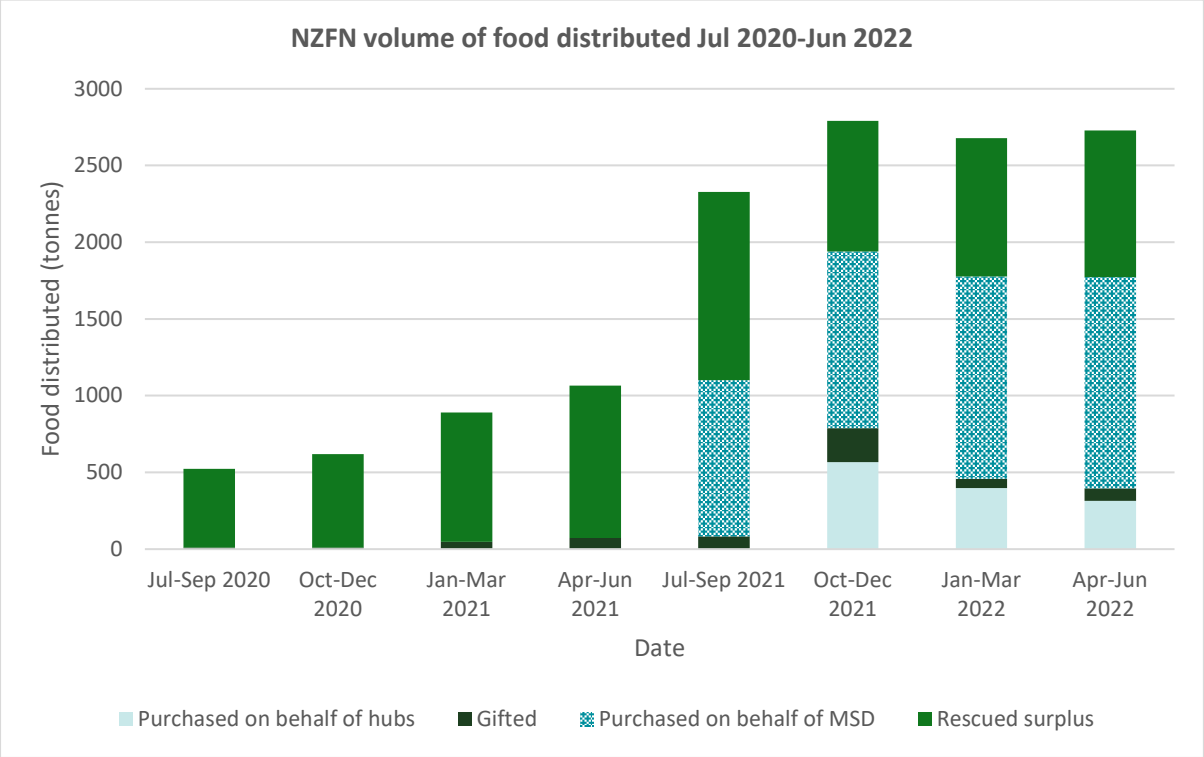

Figure 8: Bar graph showing the volume of food distributed by NZFN from July 2020 to June 2022. Prior to Food Secure Communities funding for food purchases, beginning in 2021, most of the food distributed by NZFN was rescued surplus food. Abbreviations: NZFN = New Zealand Food Network. Data provided by: NZFN.

Aotearoa Food Rescue Alliance

AFRA is an organisation that represents an estimated 90% of New Zealand's food rescue organisations, advocating on their behalf to government and food donors, fostering collaboration between food rescue organisations, encouraging best practice, and building capacity.[152-155] AFRA was launched in March 2021 with 17 members. With the recent addition of the Salvation Army, the membership has grown to 31 food rescue organisations distributed across the country in more than 100 locations (see figure 9).[153,156]

AFRA has helped to consolidate the previously fragmented food rescue sector.[138] This has resulted in greater connection between food rescue groups as well as standards and best practice being shared,

while supporting action at the local level where community knowledge is deep. Having a national body has formalised advocacy and strengthened the connection between the rescue sector and government, both during COVID-19 lockdowns and beyond. AFRA members are strongly linked to NZFN. Three quarters of AFRA members serve as NZFN hubs and approximately 30% of the food distributed by AFRA members comes from NZFN.[154] Collaboration between NZFN and AFRA is important for the smooth operation and success of food rescue operations at the national level.

Not all food rescue organisations in the country are affiliated with AFRA. For example, Foodbank Canterbury (also known as FoodBank Aotearoa New Zealand) is a food rescue that is affiliated with the Global Foodbanking Network instead of AFRA (see case study 7).[157,158]

Figure 9: Map of AFRA's 31 members. Two members, the Salvation Army and KiwiHarvest, are present in multiple regions across the country. Image credit: AFRA.[159]

The food rescue sector has the potential to be a key plank in emergency responses beyond COVID-19

The infrastructure, capabilities, and connections held by the rescue sector were crucial to its ability to support the distribution of surplus food during the COVID-19 pandemic. NZFN in particular facilitated the efficient distribution of food, along with the downstream organisations that distribute NZFN food from community hubs.[160] It wasn't just central government that relied on the rescue sector at this time; some local councils leveraged rescue organisations to distribute purchased food through their networks as well.[52] NZFN and the broader food rescue ecosystem has the potential to play a similar civil contingency role in the event of future emergencies, freeing up Defence personnel and other emergency responders to focus on other issues. Discussions to this effect are already underway.[158,161]

2.3 We don't know if the distribution of rescue organisations matches need

Efforts to understand food distribution capacity in the face of COVID-19 led to the country's first community food organisation mapping work.[52] There are several sources that detail the distribution of food rescue activities throughout the country.

- NZFN has a map of its 61 community hubs.[162,163]
- AFRA has a map of its 31 members (many of which are also NZFN community hubs).[159]
- The Pātaka Kai Open Street Pantry Movement has a map of community pantries, with details down to the street level.[164] There is also a map of community fruit and vegetable stands,[165] with some overlap between the two maps.
- Kore Hiakai has produced a map detailing the distribution of a wider range of community food organisations, including those represented in the above maps, as well as food banks, community gardens, fruit and vegetable cooperatives, and community meals.[166]

We have combined the information available from these sources (see figure 10), focusing on organisations that are involved in food rescue. Continuing to strengthen the coverage of this mapping work and keeping it up to date will help both food donors and people seeking to access rescued food connect with the right community food organisation.

While an overarching understanding of the rescue sector and broader community food provision network has been established, details of the capacity, operating models, staffing arrangements and infrastructure of the nation's network of food rescue organisations, foodbanks and other community food providers is not comprehensively understood at the national level. This makes it challenging to estimate the potential to grow the sector. In addition, without granular data on food insecurity (see section 1.4) or surplus food (see *Food waste: A global and local problem*) it is hard to estimate the extent to which the distribution of rescue organisations matches need and surplus food availability. See case study 4 for an initiative in Australia that seeks to map the extent to which the distribution of food insecurity is matched by community food provision efforts.

Continuing to strengthen the coverage of this mapping work and keeping it up to date will help both food donors and people seeking to access rescued food connect with the right community food organisation.

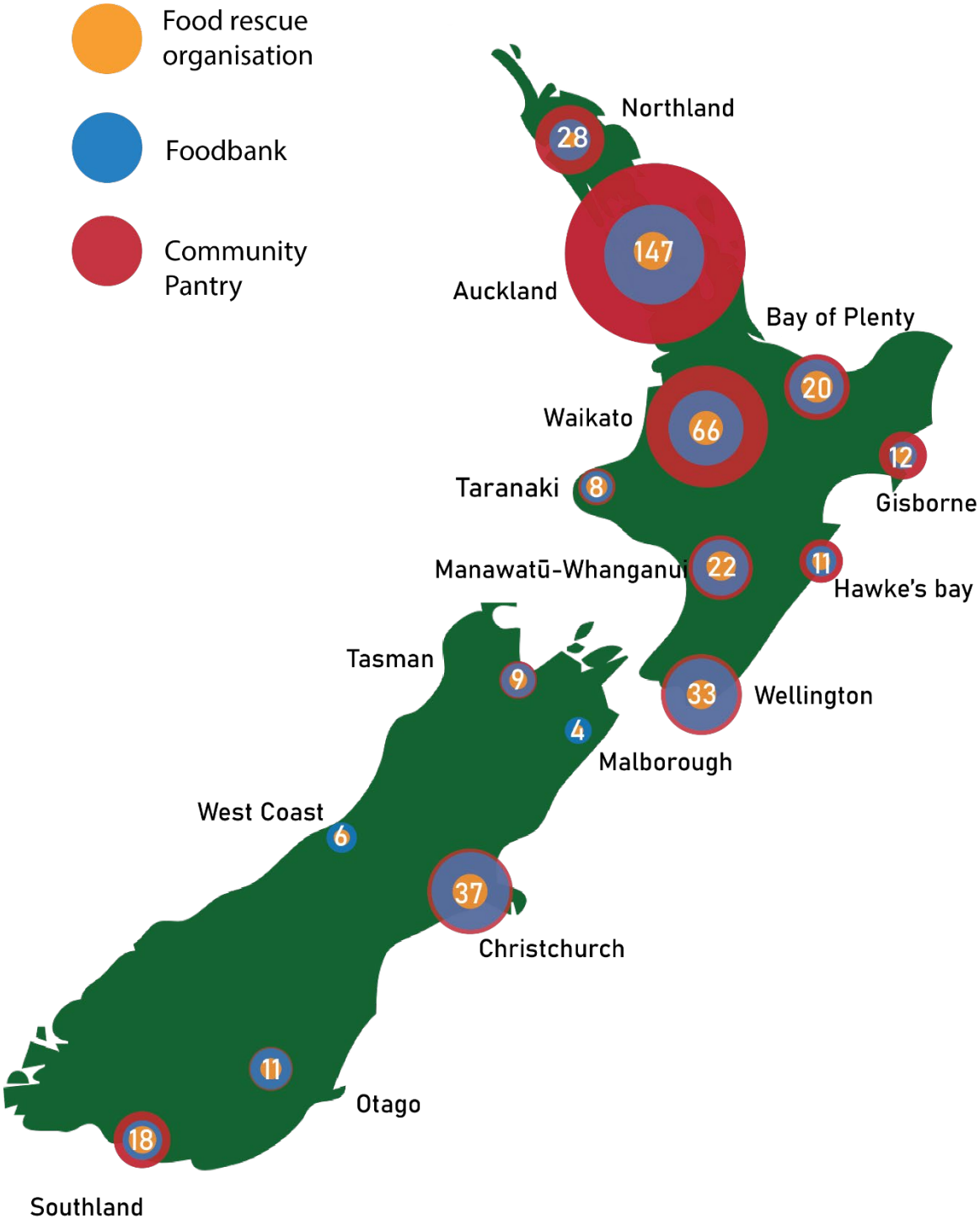

Figure 10: Food ecosystem map, showing food rescue organisations, foodbanks, and community pantries and their spread throughout Aotearoa. Food rescue organisations include AFRA members, NZFN hubs, and non-affiliated food rescue organisations. The map gives an indication of the food rescue ecosystem and its spread throughout NZ at the time of publishing. While the map shows the large and wide spread of community pantries, they operate on a small scale, so while large in number don't rescue as much food as other food rescue organisations. Traditional foodbanks, also seen in significant numbers throughout Aotearoa, do not operate solely in the food rescue space with some rescuing food themselves, and most recipients of food rescue organisations. Data sourced from: Kore Hiakai,[166] AFRA,[159] Pātaka Kai Open Street Pantry Movement,[164] NZFN,[163] and FoodBank Aotearoa New Zealand (FBANZ).[157] Note that community pantries from the community fruit and vegetable stands[165] are not included in the above map.

Case study 4: Foodbank Australia Hunger Map

Foodbank Australia, a major food rescue and relief organisation in Australia that supplies food to 2,950 downstream charities, has undertaken a spatial assessment of the distribution of hunger in Australia, comparing it with the distribution of food they supply across the country.[106,167]

The first phase of the work involved two core elements. Firstly, the distribution to downstream charities that receive food from Foodbank was mapped, including the volumes of food supplied to them over the course of a year. This allowed Foodbank to see how much food was going to different geographic regions. Secondly, the distribution of people experiencing 'everyday' (rather than event-based) food insecurity was mapped based on a model developed using predictors of food insecurity.

While the modelling-based methodology underpinning the *Foodbank Hunger Map* will continue to be refined (particularly as additional data becomes available to inform the food insecurity model), the exercise provides an indication of where food insecure households are distributed down to the suburb level and provides an indication of where Foodbank's supply of food is adequate, in excess of need, insufficient, or absent. This has already enabled Foodbank to become more strategic in its work, revealing where significant gaps in the food supply network exist. In the future, the other major food rescue organisations in Australia will join Foodbank in this mapping exercise, to provide a shared national picture of the sufficiency of food supply.[168] Future additions to the map aim to show greater detail relating to accessibility to food relief, and the logistics networks of food rescue organisations.[169]

In its 2021 action plan, AFRA set an intention to expand its reach into regions without food rescue, with a focus on low socio-economic areas.[155] A supply and demand mapping exercise similar to that undertaken by Foodbank Australia would enable a data-driven approach to the rescue network's expansion and support more strategic investment in the food rescue sector and other community food organisations.

2.4 There are a range of rescue models throughout the country

Each rescue organisation operates slightly differently due to the differing needs and contexts of the communities in which they operate.[62] Rescue models can be broadly categorised as follows:

- Community food hubs distribute rescued (and donated) food directly to community organisations, who pass the food on in food parcels and may include it in meals and baked goods for food insecure recipients. Community hubs often vet the organisations they distribute to.[159]
- Mixed-model food rescue organisations are similar to community food hubs, but generally also provide other services such as cooking community meals, running community gardens and composting, or operating foodbanks.[159]
- Freestore organisations provide rescued food directly to individuals, typically with no means testing or questions asked.[159]

Each rescue organisation operates slightly differently due to the differing needs and contexts of the communities in which they operate.

- While more informal than food rescue organisations, community pantries and fridges represent a fourth approach to the distribution of surplus food.[164]
- Virtual food rescue organisations serve as 'matchmakers' between donors and recipients in the community. The rescue organisation doesn't handle food directly or have any physical infrastructure but connect food and recipients.[170] This model is more common overseas, and in New Zealand is primarily represented by Foodprint, an app which enables hospitality businesses to advertise discounted products direct to consumers.[171] Footprint's adaptive pricing solution to food waste will be covered in a subsequent report.

Community food hubs

Community food hubs (see glossary) act as the link between surplus food and community organisations that already provide food and social services in the community. They pick up surplus food from food retailers and other food businesses. This food is then distributed to a wide range of community groups who distribute to recipients.

Community food hubs generally have some level of infrastructure surrounding them, which ensures they can function. This include freezers, fridges, and trucks. Beyond this they have connections with a range of food donors, across a region or community. Community food hubs can facilitate food rescue for organisations that would not have the capacity or connections to rescue food themselves, and also serve as a centralised point of contact for food donors to deal with.[1] Examples include Kaibosh in Wellington (see case study 5), Satisfy Food Rescue in Canterbury (see case study 6), Foodbank Canterbury (see case study 7), Nourished for Nil in Hawke's Bay, and Fair Food in Auckland.

Case study 5: Kaibosh

Kaibosh Food Rescue is a Wellington-based organisation. It was founded in 2008 at a Wellington site (see case study 2) and has since expanded, with a Hutt valley site opening in 2015 and a Kapiti-Horowhenua site opening in 2020. Kaibosh's goal is "zero food waste, zero food poverty,"[6] while acknowledging that root cause solutions are needed to enable food security.[172]

Figure 11: Matt Dagger (far left) and Lance Williams (far right) hosting OPMCSA at Kaibosh.

In 2020/21 Kaibosh diverted almost 500 tonnes of food, distributing it to over 130 downstream organisations. Kaibosh's work relies on over 250 volunteers. Infrastructure supports Kaibosh's work, including chilled trucks to pick up and deliver the food and warehouses with fridges for storage. Kaibosh wants to ensure the food it is delivering nutritious food to communities, so ensures 70% of its rescued food is comprised of fresh produce, dairy, and meat (see figure 18). It often reject items such as bread if received in excess of its target proportions.[172] Kaibosh weighs the food it receives, helping to quantify the impact of its work. Kaibosh sends food waste to locally operated composting facilities that compost the food not suitable for human consumption or divert it to animal feed. Since 2013,

9% of Kaibosh's food rescued from local sources has been diverted further down the food recovery hierarchy.[173]

The community groups supplied by Kaibosh include soup kitchens, marae, foodbanks, residential facilities, and other essential social service providers. For example, the Wellington site has a wide range of recipients from the Free Store, City Mission, foodbanks, and social housing. Kaibosh has criteria for recipient organisations, which include ability to handle food safely, legitimacy as an organisation, and provision to people experiencing food insecurity. Kaibosh is focussed on supporting organisations that provide or direct people to wrap around services. The donors of food include supermarkets, manufacturers, primary producers, bakeries, and cafés,[1,174] as well as NZFN.[163]

Case study 6: Satisfy Food Rescue

Satisfy Food Rescue operates in Canterbury, based in Kaiapoi.[175] It serves the Waimakariri and Hurunui districts, as well as Christchurch City to a lesser extent. Satisfy receives food from 32 donors and via NZFN, and distributes to 31 downstream organisations.[176] Satisfy volunteers and drivers use a chiller van to pick up surplus food and deliver food to its premises. Volunteers sort through the donated food dividing it into different food types ready for donation. Satisfy weighs the rescued food, with volunteers tracking the amount of food rescued and the categories it falls in, as well as the recipient organisations the food goes to. The food is chilled and stored, with recipient organisations then picking up the food on the same day.[175] Satisfy rarely has to turn away food. If it does, this is usually due to it being too damaged or close to spoilage at the donor's site.[176] Satisfy collects data on the amount of waste diverted down the food recovery hierarchy, with 3% of food going to animal feed and 0.1% going to compost for the January 2020 to June 2022 period.[176] Satisfy also has a partnership with the Oxford and District Lions whereby they plant vegetables on a member's land and harvest them weekly for Satisfy.

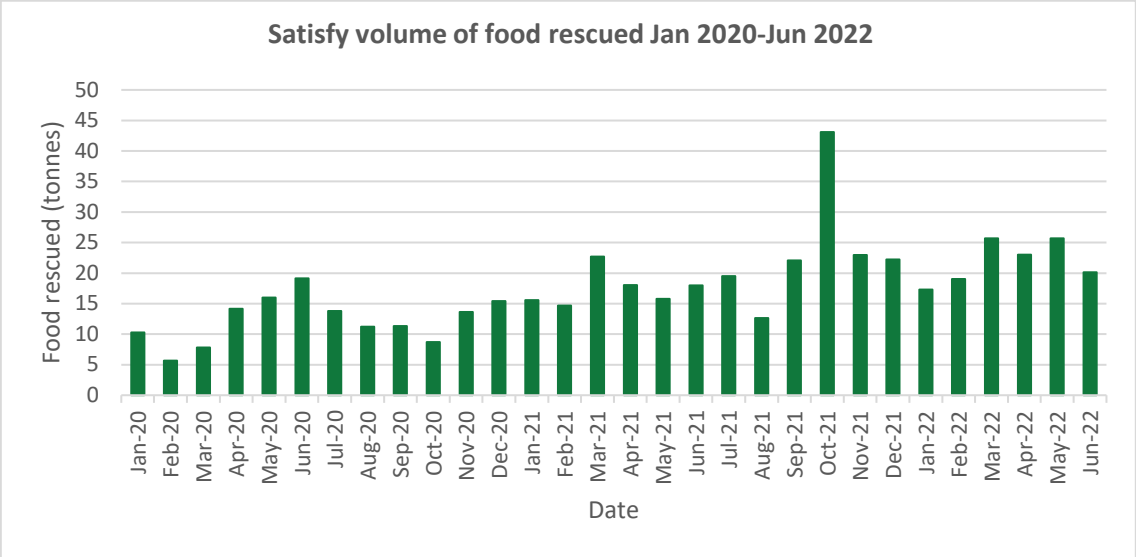

Figure 12: Bar graph showing volumes of food rescued per month by Satisfy Food Rescue. This graph highlights the wide variation in rescued food volumes, as well as an overall trend towards increasing volumes of rescued food from January 2020 to June 2022. The October 2021 spike is predominantly the result of a large donation from Westlands of 20 pallets of short-dated cream. The quantity of cream was too much for Satisfy, so they took 3 pallets and NZFN distributed the other 17 pallets to food hubs throughout the South Island.[176] Data provided by: Satisfy Food Rescue.

Satisfy's data from January 2020 to June 2022 (see figure 12) highlights a gradual growth in the volume of food rescued and also reveals the stochastic nature of food rescue, with volumes varying unpredictably month-to-month.[176] Over this period, fresh produce was the main category rescued, followed by bakery and bread items, and then dairy. However, as with total food volumes rescued, there is substantial variation in the volume of each food category rescued month-to-month. For example, the volume of dairy products rescued per month ranges from under a tonne to almost 25 tonnes, with the spike due to a large donation of UHT cream 'too aged to sell,' but still safe for human consumption.[176] This variability is characteristic of the rescue sector and has been termed 'the surprise chain,'[177] representing one of the sector's most significant operational challenges.

Case study 7: Foodbank Canterbury (also known as Foodbank Aotearoa New Zealand)

Established 16 years ago, the Global FoodBanking Network (GFN) is an international grouping of food rescue organisations that assists food rescue organisations in their establishment, scaling, and maturation, and certifies food rescue organisations to verify the professionalism, safety, and transparency of their practices.[178]

FoodBank Aotearoa New Zealand (FBANZ), based in Canterbury and founded in 2016 by Janice and John Milligan, is the New Zealand Accredited Member of GFN.[157] FBANZ acts as a community food hub, harnessing established community organisations to maximise their impact and get surplus food where it needs to go. FBANZ rescues food from across the food industry, including supermarkets, grocers, wholesalers, hotels, and caterers. The volume of food rescued and distributed by FBANZ has grown dramatically over the past few years, from approximately 350 tonnes in 2018 to over 970 tonnes in 2021 (the 2021 figure includes 46 tonnes of purchased food as part of FBANZ's Hunger Action Teams programme, described below).[179]

Figure 13: John Milligan at Foodbank Aotearoa New Zealand

During the first COVID-19 lockdown, FBANZ noticed a significant increase in the number of calls it received regarding food parcels. Concerned that there was unmet community need for food, FBANZ established its Hunger Action Teams (HATs) programme, which has been running for two years now. Through the HATs programme, corporate volunteer teams join FBANZ twice a week to make up family packs of purchased food for distribution into the community, supplementing FBANZ's food rescue activities.[158]

FBANZ relies on volunteers to function and has corporate groups and individuals who help them with their work. They have infrastructure including a refrigerated truck, storage space, and fridges. FBANZ is also involved in initiatives to prepare to support food access and distribution in the event of a major earthquake triggered by the Alpine Fault, which could cut road access to the West Coast for an extended period of time.[158]

GFN gives support to its global network, with the ability to share best practice and international understandings.[158] This includes technical guidance around things like food safety, and GFN ensures that the food rescue organisations in their network have support to implement best practice. GFN has been a rich source of information for FBANZ, ensuring they understand and can implement best practice occurring overseas. FBANZ is seeking to continue to grow its operations in Canterbury, seeing the connection with GFN as key to its continued success.[158]

Mixed-model food rescue organisations

Mixed-model food rescue organisations (see glossary) have a purpose and operation model that extends beyond food rescue. These broader operations are diverse. For example, some have an environmental focus (e.g. Go Eco, see case study 10) while others have additional social aspects to their work (e.g. the Salvation Army, see case study 8).[180] Often, mixed-model organisations operate as a centre, with a broader sense of community and help surrounding rescued food. For those with an environmental focus, often community gardens and composting occur, offering those who come to access food an opportunity to engage more widely in environmentally sustainable practices (see case study 9). Mixed-model organisations that have a social focus provide broader social support for their clients, such as housing, budgeting services, cooking classes, cooked meals, or social services support.

Case study 8: The Salvation Army

The Salvation Army is a social service agency with a diverse kaupapa. Foodbanks form a core part of the Salvation Army's services, but the organisation also engages in food rescue, making it an example of a mixed-model organisation. The Salvation Army assesses food security and food need as part of a broader needs assessment approach when responding to clients. While there is no formal limit on the number of food parcels households can receive, service guidelines encourage welfare staff to explore further forms of support if clients need regular food parcel support. The Salvation Army model means that clients can access wrap around services, so complex or underlying issues beyond the immediate need for food can be picked up and potentially addressed.

Food parcels are made up of a mix of rescued, purchased, and donated goods. The Salvation Army picks up grocery items from supermarkets throughout the country themselves, with local foodbanks engaging directly with supermarkets in their area.[181] The items they collect often don't need refrigeration, as the Salvation Army is not equipped with refrigerated trucks other than in Palmerston North. Beyond grocery item collection, food rescue organisations like Kaibosh and KiwiHarvest donate rescued food items such as vegetables, meat, milk, and other goods to Salvation Army foodbanks. They may also receive larger bulk donations from food producers or processors and manufacturers. Rescued items are combined with donated goods and purchased goods to make up the food parcels for recipients.

Case study 9: Waiheke Resources Trust

Waiheke Resources Trust operates on Waiheke Island off the coast of Auckland.[182,183] It manages a sustainability centre and works to support thriving environments and communities by engaging, educating and supporting people in environmental restoration, food resilience and waste minimisation. It runs a mixed-model food rescue project, Kai Conscious, alongside complementary projects that encourage and educate on domestic and small-scale community composting, food waste reduction and kai gardening. The Trust's commercial composting social enterprise is underpinned by the circular bioeconomy: it collects compostable material from local businesses around Waiheke Island and sells the compost produced on-island back to the community.

Figure 14: Juliet visiting Waiheke Resources Trust.

Kai Conscious is a combination of the community food hub and community fridge model, as well as the provision of a rescued food community meal on Fridays. The Trust is focused on the environmental impacts of surplus food, as well as using food as a resource to build community. The Trust employs two alternating food rescuers who take an electric van (co-funded by the Waste Minimisation Fund, see annex 4) to collect food from supermarkets, bakeries, and eateries across the island (see figure 15 for food rescue volumes). They redistribute the food to budgeting services and other local hubs on the island, with a final stop at the outdoor community fridge and pantry at the sustainability centre at about midday. Members of the public can access this food at any time. It tends to go quickly so the team staggers the food, especially meat and dairy products. This model means members of the public can donate food at any time, with public donations including bumper home crops, surplus from winery gardens, or even purchased food.

With a focus on ensuring that nothing goes to waste, there is no means testing and no questions asked, and Waiheke Resources Trust hopes that this removes the stigma for those who access the food. By delivering a majority of the food to budgeting services and other community organisations to distribute, the Kai Conscious project supports those in need and ensures that food will make it to vulnerable community members that can't come to the community fridge. Rescued food is also used for the Trust's food waste education initiatives such as community cooking workshops and the Waiheke High Sustainability Group's Sustainable Soup Tuesdays.

Beyond this, there is a bokashi bin, worm farm and traditional composting system several metres away from the fridge. The food rescuers compost any inedible or spoiled food that is mixed in with edible surplus food. This ensures a holistic approach to food waste and the community engaging with the circular bioeconomy on a local scale.

The Trust's Friday community meal is run by two staff and a rotating team of volunteers. They use rescued food and volunteers gather new cooking skills and add waste minimisation strategies to their repertoire as they adapt to what has been brought in on the day. Every

Friday a diverse and nutritious meal is cooked for the 50 to 100 people who come through the door. The meal serves the community as a whole; anyone can come and join for conversation and food.

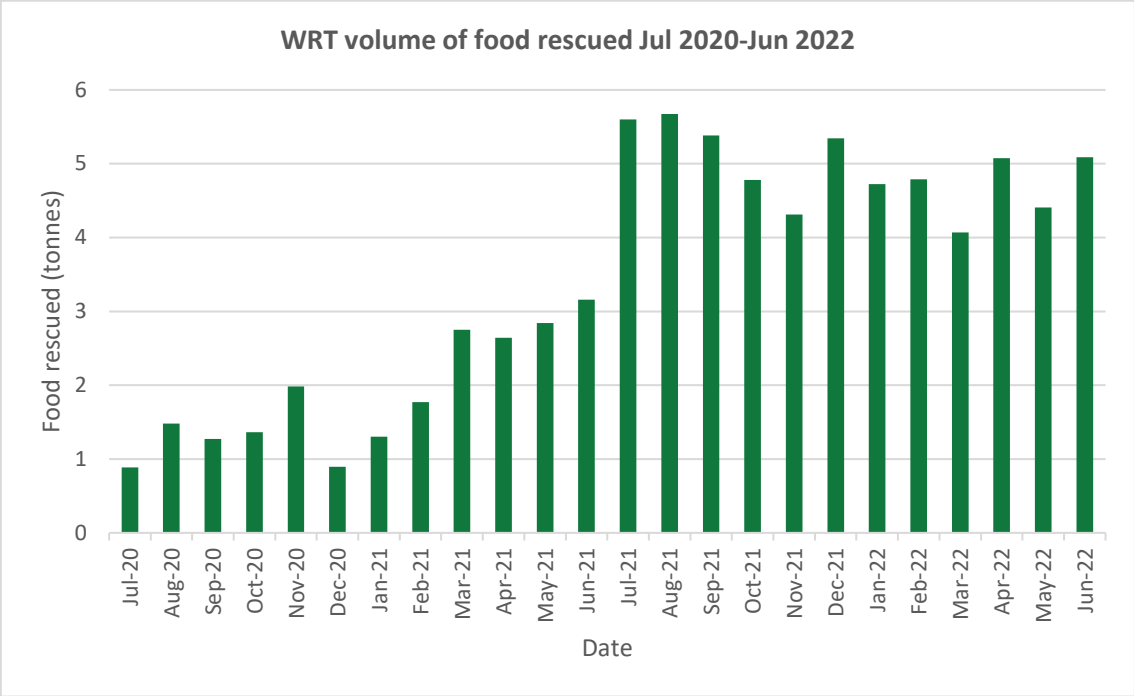

Figure 15: Bar graph showing volumes of food rescued per month by Waiheke Resources Trust. This graph highlights the wide variation in rescued food volumes, as well as an overall trend towards increasing volumes of rescued food from July 2020 to June 2021. Abbreviations: WRT = Waiheke Resources Trust. Data provided by: WRT.

Case study 10: Go Eco Food Rescue

Go Eco food rescue operates nine urban free stores in collaboration with community centres across Hamilton, six of which operate five days per week.[184] A further three stores operate outside the city boundary. Food is redistributed from supermarkets, food distribution agencies, growers, producers and the abundance of community gardens and backyards.

Go Eco aims to reduce food rescue emissions by collecting and delivering to community centres with volunteer teams who sort the food and operate the freestores. The operating model connects people to their local community centre and centre services, meaning people can voluntarily seek other information, services, or support while accessing food without barriers in a walkable distance from their home.

Go Eco's focus is stopping food from going to waste. This means there is no access criteria. The centres are supported to develop composting systems and gardens, and Go Eco supports these with education and food growing support. More than 430 tonnes of food were redistributed in communities by Hamilton freestores between July 2021 and June 2022.

Community Houses and Centres were well placed to redistribute food in communities including support for families in isolation during the pandemic. Go Eco Food Rescue redistributed food to 51 organisations including food banks, crisis services, residential services, and community-based free stores.

Case study 11: Everybody Eats

Everybody Eats serves a community meal, with a permanent site in Auckland's Onehunga and a pop-up site in Te Aro in Wellington. Everybody Eats is a 'pay-as-you-feel' dining concept with the aim of serving everyone.[185] It serves a set menu three-course meal, five nights a week in Onehunga and three days a week in Te Aro.[186] Its food is made from donated surplus food from a variety of sources, including KiwiHarvest, New World, Farro Fresh via Fair Food, Daily Bread, and Karma Cola.[187]

The model of pay-as-you-feel means that they serve a diversity of customers. Some pay the same as they would in another restaurant, while others might give a couple of dollars, and others may not be able to pay anything. This model allows each customer, regardless of how much they pay, to have a dignified dining experience and a nutritious cooked meal as well as fostering community connections.[188] Everybody Eats' approach makes eating out accessible for people from all walks of life, while simultaneously raising awareness about food waste and surplus food. Everybody Eats, like most rescue organisations, relies on donations and volunteers to operate.[185]

Freestore organisations

Freestores (see glossary) operate in several places in Aotearoa, including the Free Store in Wellington and Just Zilch in Palmerston North (see case study 12). There is often no means testing, with recipients able to take what they need – although some freestores have limits to what people can take. The absence of means testing is helpful for those who might not be eligible for government or other means-tested support, but still face food insecurity.

Like community hubs, freestores pick up food from supermarkets as well as cafés, restaurants, and bakeries. These items are then transported to a site that acts as a store. Volunteers unpack and sort the food, with people able to come and choose what items they want from those available on the shelves and fridges in a similar way to a supermarket.[189] Freestores generally run for a set time window. They not only offer free food but also a social setting.[190] Freestores, along with other models like community pantries and fridges allow people to make their own food selections (albeit from a limited range),[190] although there can still be a sense of stigma associated with this model,[189] especially when queuing for food where this occurs.

Case study 12: Just Zilch

Just Zilch is a freestore in Palmerston North that was founded by Rebecca Culver in 2011 and inspired by the Free Store in Wellington. Just Zilch operates as both a community hub and a freestore. As a community hub, it delivers rescued food to about 30 to 40 community organisations per week in the Manawatu region and beyond. In addition, Just Zilch operates a freestore at a permanent site in Palmerston North.[191]

From Monday to Friday, the freestore opens twice a day, from 1 pm to 2.30 pm and again from 4.30 pm to 6 pm. Volunteers collect surplus food from cafés, bakeries, producers, manufacturers, and supermarkets around Palmerston North. People line up and take turns going through the store, choosing items that they want to take home. No ID is required and there is no means testing. The simple request is that people take what they need for the day and keep in mind the needs of others.[192]

COVID-19 had a significant impact on Just Zilch's ability to operate. In 2021 Just Zilch moved to having trays that volunteers push across a table to customers with a selection of goods, with the customers able to choose what they take home. This model still allows people some level of choice, while trying to keep volunteers and customers as safe as possible from COVID-19.[193]

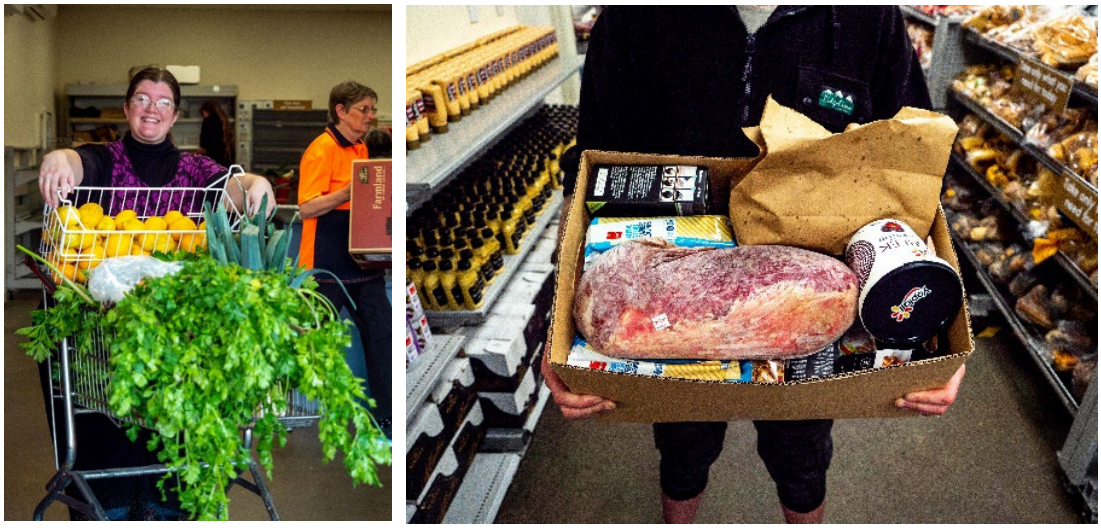

Figure 16 (left to right): Rebecca Culver, founder of Just Zilch; Box of rescued food chosen by a Just Zilch customer. Image credit: Alexander Robertson, Imaging and content specialist Palmerston North City Council.

Just Zilch has collected data on the food it rescues and distribute. Until last year, the data measure was the number of food items given to recipients. While this helped show the increase in Just Zilch's operation over time, it didn't allow for a precise understanding of the volume of food rescued or distributed. Since last year, Just Zilch has recorded the weight of the goods rescued. Just Zilch has also started recording the amount of waste sent to compost and landfill as well as the amount of food rescued in different food categories, in line with AFRA's guidelines (see section 3.1).[193] Just Zilch, along with the rest of the rescue sector, is continuing to strengthen its data collection practices, which will facilitate targeted resourcing to scale operations as required.

Community pantries community pantries and fridges – take what you want, leave what you can

Community pantries and fridges (see glossary) contribute to the rescue ecosystem in an informal and place-based way. Community pantries can be found throughout Aotearoa.[164] They are accessible 24/7 and have no formal staff, although there are often kaitiaki who help look after them. The number of pantries listed with the Pātaka Kai Open Street Pantry Movement has burgeoned from 65 in 2019[62] to 242 listed in August 2022.[164] To help people connect with their local pantries to collect or donate food, the Pātaka Kai Open Street Pantry Movement includes a list and interactive map that shows the location of pantries throughout the country.[164] There are also online communities that function similar to community pantries without the phsycial infrastructre, promoting share economies in local areas.

Quantifying the contribution of community pantries to the redistribution of surplus food is difficult as there is no formal process for donation and no tracking food being left, taken, or wasted. In addition, some of the food left in community pantries is surplus while some is purchased and donated by people wanting to do something for their community.[194] It would be technically simple to automate data collection, but resource intensive.

Community pantries can offer local communities a place to donate small quantities of surplus food that can't readily be donated via other food rescue models, which could include food from their garden or something they overpurchased. Anyone can access the food irrespective of their need. However, there is not a guarantee of food being there when people visit – they can't be relied on as a source of food.

Figure 17 (left to right): A community pantry on Great Barrier Island, next to a community garden; Waiheke Resources Trust community fridge. Image credit: Waiheke Resources Trust.

Community fridges operate in the same way but enable perishable food to be more safely donated and accessed. Due to the power and shelter required to support community fridges, they are less common and generally managed more formally than pantries, by a non-governmental organisation, council, or community group.[62] For example, the Waiheke Resources Trust has a community fridge (see case study 9),[195] and a community fridge operated in central Auckland between 2016 and 2019, facilitating the rescue and redistribution of an estimated 12 tonnes of food, based on extrapolation from a snapshot audit.[196]

3. The rescue sector's impact

As outlined in section 1.1, the rescue sector delivers environmental and social benefits. This section discusses how benefit is measured, starting with measuring the volume of food rescue and then exploring quantitation of the social and environmental benefits.

3.1 We don't know exactly how much food is rescued, but data is improving

Knowing how much food is rescued is important for understanding the sector's contribution towards combatting food waste and evaluating the impacts of any policy interventions. The government doesn't keep track of how much food is rescued. This means that the volume of food rescued can either be determined by gathering data from donors (who report how much food they donate) or rescue organisations (who report how much food they receive). There are relatively fewer rescue organisations than there are food donors, so it is most straightforward to measure on the rescue organisation side of the equation. Further, data collected by rescue organisations can provide insight into the amount of food received that ultimately wasn't suitable for onwards distribution to recipient individuals or organisations.

Data collection practices in the rescue sector have historically had limitations

Historical data collection practices in the rescue sector have limitations. These limitations are significantly less pronounced for larger organisations such as NZFN, which deal with producers, processors, and manufacturers, handling food in bulk and in forms that are easy to measure (e.g. pallets). However, calculating the volume of food rescued from the retail sector or other sources, where donations are smaller and products are more varied, is less straightforward. Historic practices for measuring rescued volumes mean that figures to date can often be treated as approximations only.

Historic practices for measuring rescued volumes mean that figures to date can often be treated as approximations only.

The majority of food rescue organisations collect data on how much food they rescue and redistribute, but with varying practices.[62] For example, some rescue organisations use scales to weigh donations at every pick-up point, others weigh donations back at their base after food that is unsuitable for donation has been removed, and others assume a banana box of food weighs 15 kg (although less than a fifth of AFRA members currently use this rule of thumb).[156,193,197] Some rescue organisations record rescue volumes by type (e.g. meat, produce, bread, etc), which adds valuable granularity (e.g. Kaibosh, Satisfy, Waiheke Resources Trust (WRT), NZFN – see figure 18). They may also record where the food is distributed to. Some, including Satisfy, NZFN, WRT, Fair Food, and Kaibosh, also record how much of the food they receive is ultimately unsuitable for further distribution and thus has to be managed by the rescue organisation (e.g. through donation to farmers for animal feed, compost, landfill, etc).

Based on data from AFRA and NZFN, just over 11,500 tonnes of food were rescued in the last year: just over 7,600 tonnes were rescued by AFRA members and nearly 4,000 tonnes by NZFN.[154,198] While this doesn't capture all rescue activities – particularly volumes of food passing through community pantries, and non-AFRA members – it covers the majority. AFRA works to ensure the figures reported by its members exclude food passed on to them

Based on data from AFRA and NZFN, just over 11,500 tonnes of food were rescued in the last year …

via NZFN, to avoid double counting. Note that the AFRA data was collected when just 23 members were onboard.[154] With membership now at 31, future data sets will be more complete. Also note that the AFRA data is for the 12-month period from 31 January 2021 to 31 January 2022, while the NZFN data period is for the 2021 calendar year.

AFRA is rolling out a strengthened data platform

AFRA members are strengthening and standardising their data collection efforts. This will lead to more complete and high-quality data on the volume of food rescued in the coming years, which can be used to help quantify the impact of food rescue to the environment and community at the national level (see sections 3.2 and 3.3).

In July 2022 AFRA introduced a requirement for its members to report the following data:[192]

- Total food distributed (including rescued, purchased, provided by NZFN, etc) and total food rescued (kg/month).
- Total food distributed and total food rescued by food category (kg/month). The food categories for reporting are as follows: produce, beverages, dairy, meat, prepared foods, bakery, grocery, other (non-food).
- Total food provided by NZFN (kg/month).
- Total waste generated (kg/month), recorded by destination: landfill, animal feed, composting, recycling.
- The total number of food donors providing food per month.
- Total number of recipient organisations receiving food per month.

AFRA members are strengthening and standardising their data collection efforts. This will lead to more complete and high-quality data on the volume of food rescued in the coming years …

AFRA has developed a philanthropically funded online data platform for members to input this data, which most AFRA members have transitioned to or are transitioning to.[192] Aggregated data across all AFRA members will be open for anyone to use – including government and academics studying the rescue sector. AFRA is also working on a collaboration with data analysts to help with data visualisation and utilisation of the data for insights and forecasting.

With existing data collection varying, complying with the new requirements will be straightforward for some rescue organisations and a substantial shift for others.[192] Robust data collection takes time and requires resources, and shouldn't become an impediment to operations. In addition, rescue organisations may be asked to report data to funders (e.g. MfE, MSD) and food donors.[197] If data requirements aren't aligned, the burden of reporting could become considerable. While improved data collection benefits network and policy agencies, it is an additional cost to smaller organisations that may not benefit them directly.

How much food is out there to be rescued?

The volume of food rescued needs to be understood in the context of the total volume of potentially rescuable surplus food, or as a proportion of total food waste produced in Aotearoa. However, as described in *Food waste: A global and local problem* we only have a rough idea of the nation's total annual food waste volume (it's probably in the hundreds of thousands of tonnes or possibly into the millions). This means we don't have a high confidence numerator *or* denominator from which to make an estimate of the proportion of total food waste or total food surplus that is rescued.

Rescued food as a proportion of total food waste has been estimated for other countries. In 2021, Australia's rescue sector captured about 0.2% of the country's total recovered and unrecovered food waste[199] while in the EU in 2015 members of the European Federation of Food Banks rescued 0.6% of the estimated volume of food waste generated in the EU.[200] Neither of these figures reflect the proportion of food rescued relative to edible surplus food, instead comparing rescued food volumes to total food waste volumes, which includes food unsuitable for human consumption. However, both figures serve to highlight that food rescue is only one of many solutions required to combat food waste.

In Aotearoa, our limited data on food waste volumes mean we can only make a ballpark estimate. If it is assumed that household food waste (the stage of the food supply chain for which we have the most robust national data)[33] represents roughly 14% of recovered and unrecovered food waste in Aotearoa (as it does in Australia)[199] and if the total volume of rescued food is optimistically inflated to 20,000 tonnes to account for data gaps, food rescue currently handles less than 1% of food waste in Aotearoa. It would be valuable to develop an improved understanding of the volume of surplus food that currently isn't rescued to understand how much this figure could potentially grow. In the retail sector, for example, we know that only 15% of unsold supermarket food is rescued.[5] Knowing what proportion of the remaining 85% is safe, edible surplus food would help to understand opportunities for further growth in rescue volumes.

… food rescue currently handles less than 1% of food waste in Aotearoa. It would be valuable to develop an improved understanding of the volume of surplus food that currently isn't rescued to understand how much this figure could potentially grow.

3.2 The social impacts extend well beyond food in bellies

The chief social impact of the rescue sector is the provision of food to people in need. But the social impacts extend well beyond this. While complex and hard to measure,[106] the social value of the sector can be qualitatively described. In addition, a research project commissioned by AFRA has recently been completed, calculating the social return on investment (SROI) achieved by food rescue organisations (see below).

Rescued food helps abate hunger and nourish people in need

Providing food to people in need is highly impactful. Not only can it help to address immediate hunger but can also provide nourishment that can promote health and wellbeing and help people connect with community and broader support services (see section 1.4).

To best support gains in physical health, the nutritional needs of recipients should be considered. The data project being led by AFRA (see section 3.1) will improve our ability to understand the types of food being distributed by the rescue sector. Rescued food is a key source of fresh produce in food parcels in Aotearoa[201] – prior to the food rescue sector's establishment and growth, fresh produce in food parcels was relatively rare[117] – and case studies support the notion that fresh produce constitutes a large portion of rescued food (see figure 18). An Israeli study found that including gleaning as part of the food rescue mix is a valuable way to boost the dietary quality of food aid.[202]

… prior to the food rescue sector's establishment and growth, fresh produce in food parcels was relatively rare …

Some food hubs focus primarily on perishable fresh foods like produce, meat, and dairy.[203] Meat remains among the rarest kinds of foods available to the food rescue sector, a situation that is likely not helped by conservative practices and guidance regarding handling of certain meat products in the rescue sector.[144] Conservative guidance is likely motivated by food safety concerns, which the sector could be supported to overcome with enhanced guidance, food safety training, and supporting infrastructure[204] (see section 4 for more on food safety in the food rescue ecosystem, and annex 2 for more on current food safety practices and guidance).

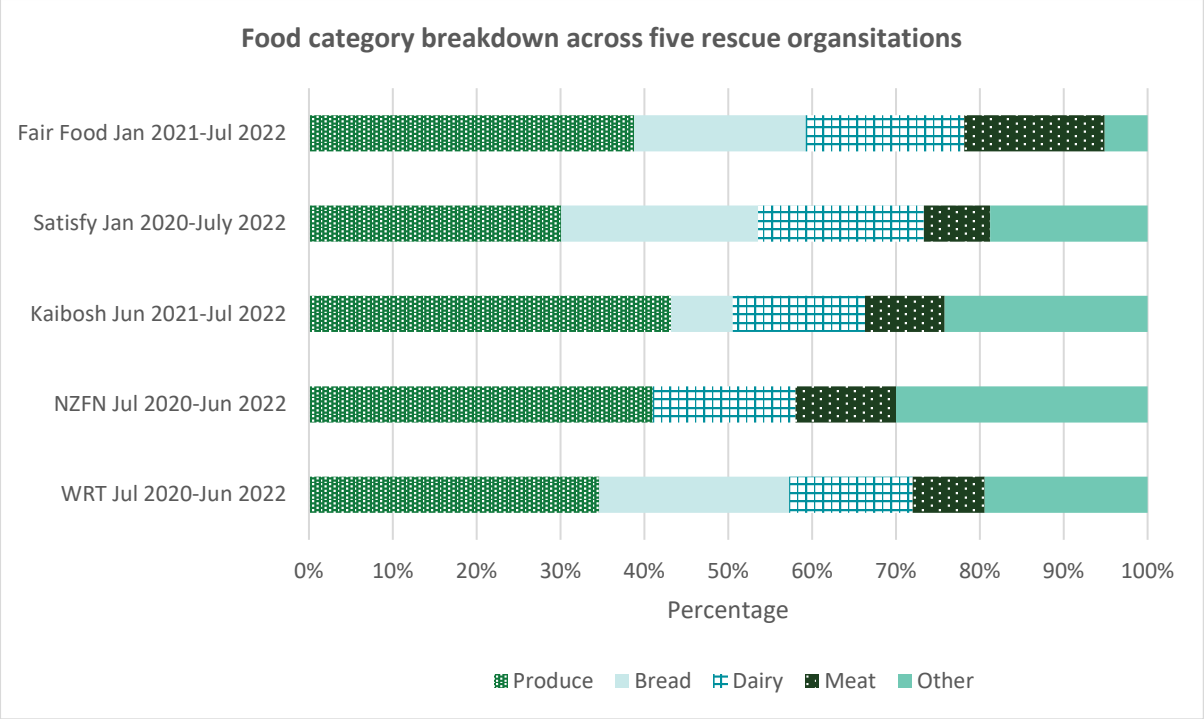

Figure 18: Categories of food rescued by Fair Food, Satisfy Food Rescue, Kaibosh, NZFN, and WRT. Note that reporting periods differ depending on data availability. In addition, because this data was gathered before AFRA's rollout of a standardised approach to reporting, only food categories that align across all case studies are presented, with non-aligned categories aggregated into 'other.' Abbreviations: NZFN = New Zealand Food Network; WRT = Waiheke Resources Trust. Data provided by: food rescue organisations.

Some rescue organisations actively take nutrition into account – for example, Kaibosh and Fair Food ensures that 70% of their recued food is comprised of produce, dairy, and meat.[172,203] While rescuing food according to nutritional targets has health benefits for recipients, it does mean that not all surplus food is rescued, representing a trade-off between the social and environmental values of food rescue organisations.[121] For example, because of the high volumes of surplus bread generated, bread is turned away by some rescue organisations in Aotearoa so that a balance of food categories is maintained.

Figure 19: Volunteers at Satisfy Food Rescue. Image credit: Satisfy Food Rescue.

How big is a meal?

The rescue sector often reports its social impact in the number of meals provided. Given the challenge of effectively communicating raw data without tangible reference points,[205] reporting impact by meals rather than just kilograms or tonnes of food rescued helps with advocacy and public engagement. However, the meal metric isn't straightforward to calculate, and will likely always be an approximation. Standard practice in the New Zealand rescue sector is to assume that every 350 g of rescue food constitutes one meal[116,206] Using this measure, tens of millions of meals are rescued annually: AFRA members and NZFN rescued a combined total of upwards of 33 million meals in 2021.

… tens of millions of meals are rescued annually …

However, the 350 g value is an oversimplification and doesn't accurately reflect the number of nutritionally complete meals provided by the rescue sector. MoH's serving size guidelines, adopted from Australia's 2013 guide and based on detailed research and modelling, lay out how much people should eat to ensure they consume sufficient energy and nutrients. Serving recommendations vary based on age, gender, lifestyle, health status, and the food types being consumed.[207] Using the guidelines for a non-pregnant, non-lactating woman aged 19 to 50 years old who eats three equally sized meals a day, an average, nutritionally complete meal could range from about 340 g to over 800 g, depending on the food types eaten. The food rescue sector's metric sits at the lower end of this range and doesn't consider whether the composition of each 350 g parcel is a nutritionally complete meal according to MoH's guidelines. The weight of packaging and inedible components of food also isn't considered.

… the 350 g value is an oversimplification and doesn't accurately reflect the number of nutritionally complete meals provided by the rescue sector.

In 2021, Kore Hiakai undertook research and released reporting guidelines to standardise the composition of food parcels and how the number of food parcels distributed is reported, taking into account MoH's nutrition guidelines.[201] This move towards nutritionally grounded reporting could be used to inspire reporting in the wider rescue sector.

Foodbank Australia uses a 500 g measure for meal reporting.[208] This value is based on Australia's dietary guidelines for children and adults and food consumption patterns in Australia, arriving at a net value of 435 g. To account for wastage of food received and not distributed, as well as the weight of packaging and the inedible components of fruit and vegetables, a correction factor of 1.15 is applied, giving the final figure of 500 g per meal. The importance of adopting an evidence-based meal measure that considers nutrition is explained by Wilson and Renzaho (2012):

> "Food rescue charities need to develop and implement accurate and accountable methods for recording and analyzing their food redistribution efforts. If these methods are based on evidence- based nutritional guidelines, food rescue charities will have greater insight into the extent their service can impact on improving the nutritional intake of vulnerable groups."[209]

A social return on investment study has helped show the wider impact of food rescue

The rescue sector's social impacts extend beyond the provision of food. Other social benefits include the sense of purpose and connection experienced by volunteers (see section 5.3) and donors (see section 5.4), and the role that food can play as a facilitator of broader social outcomes for recipients, such as serving as a route into wrap around services (see sections 1.4 and 2.4).

While this impact can be hard to quantify, a University of Otago research project commissioned by AFRA has recently been completed, calculating the SROI achieved by food rescue organisations.[210,211] The research focuses on three food rescue case studies, each of which represents a different food rescue model (see section 2.4): Satisfy Food Rescue, a community hub in Canterbury (see case study 6); Just Zilch, a free food store in Palmerston North (see case study 12); and Good Neighbour, a mixed model in Tauranga.

The research puts a dollar value on the social, environmental, and economic impacts of the rescue sector's work. The outcomes in the SROI include: reduced waste disposal costs for food donors; increased social connection and community participation for food rescue volunteers; increased organisational capacity through access to free food for recipient organisations; and the retail value of rescued food for recipients. The research is assured by Social Value International, a global standard setter that works to assure the integrity of SROI research. The average SROI ratio across the three case studies was 4.5:1. This means that for every dollar invested in food rescue, an estimated $4.50 dollars of value is generated. Although not directly comparable, this value is in step with similar studies in the UK.

The study also showcases the tangible impacts that food rescue can have on recipients. A recipient organisation of Satisfy food rescue shared the following example:

> "This [food recipient] said to me today, I think he's been [coming] over two years, 'Since you guys have been coming, I have been able to put money aside that I haven't spent on food and now my car is legal. I've got a warrant and a registration'. He said, 'It feels like my life is coming on track'. He wouldn't have been able to get his car registration and warrant if it wasn't for the food that we had given him because he wouldn't have been able to put money aside that he would normally spend on food."[211]

This recent SROI work makes a valuable contribution to the literature exploring the social impact of food rescue and the discussion of the impacts of food rescue in Aotearoa.

3.3 The rescue sector has positive environmental impacts

As outlined in the first report in the OPMCSA food waste series (*Food waste: A global and local problem)*, wasting food contributes to environmental harms both through the impacts of waste disposal and through the waste of the resources, environmental harms, and emissions embedded in food.

Rescuing surplus food is therefore an opportunity to reduce environmental harm by reducing the volume of food sent to landfill and by displacing the need for additional food production by meeting food demand with rescued food instead. Below we focus on the emissions and water use impacts of food rescue, two environmental measures of particular relevance in the context of the climate crisis[212] and growing global water scarcity.[213]

Food rescue contributes to climate mitigation, but exact figures are hard to pin down

The climate change mitigation potential of the rescue sector's work is considerable, and New Zealand's first *Emissions Reduction Plan* calls for increased donations of surplus food to rescue organisations.[214] While not as favourable as preventing food waste in the first place,[215] life cycle assessments, which account for the emissions produced and averted throughout a product's life cycle, consistently find that food rescue is climate positive – even in studies that rest on pessimistic assumptions and taking into account the greenhouse gas emissions associated with the sector's activities (e.g. transport emissions, refrigerant gases).[215-219]

While not as favourable as preventing food waste in the first place, life cycle assessments, which account for the emissions produced and averted throughout a product's life cycle, consistently find that food rescue is climate positive …

End-of-life emissions

Food rescue is often described as a way to keep food out of landfill (e.g. in the MfE in the *Emissions Reduction Plan*),[214] thereby reducing landfill emissions. As described in *Food waste: A global and local problem*, for every tonne of food sent to a landfill with gas capture in Aotearoa, based on 2020 calculations, around 0.6 tonnes of CO_2 equivalent (CO_2e) are released, and 1.9 tonnes CO_2e in the minority of landfills without gas capture.[220] For rescued food that would have otherwise been sent to landfill (which likely represents the fate of a minority of New Zealand's surplus food, see section 5.1), these emissions factors can be used to calculate the amount of avoided emissions resulting from food rescue.

Aotearoa also has emissions factors for composting and anaerobic digestion, which are based on default emissions factors from the Intergovernmental Panel on Climate Change.[220] For composting, just over 0.17 tonnes of CO_2e are estimated to be released per tonne of waste composted, compared to 0.02 tonnes of CO_2e for anaerobic digestion. Aotearoa doesn't have emissions factors for other food waste destinations (e.g. animal feed, on farm management), so where rescued food is diverted from destinations besides landfill, composting, or anaerobic digestion, the calculation is less straightforward. Other countries have emissions factors for non-landfill destinations, and global calculators exist too.[221] The emissions (and other environmental impacts) associated with different food waste management options will be explored in a subsequent report.

Life cycle emissions

Life cycle assessment approaches to accounting for the climate impact of food rescue diverge from end-of-life calculations by considering emissions theoretically avoided by capturing rescued food for human consumption, thereby removing the need to produce food anew and accrue the associated emissions. Multiple life cycle assessment studies comparing food rescue with other food waste management options find that it is the most climate positive, or among the most climate positive, way to manage surplus food in comparison to other tiers of the food recovery hierarchy, although estimates vary widely (see figure 20 and annex 1).[215-219] However, for some food products and in some contexts, upcycling to new food products for market may be preferable from a carbon footprint perspective.[217] Upcycling will be addressed in a subsequent report, and is an important part of the solution to food waste.

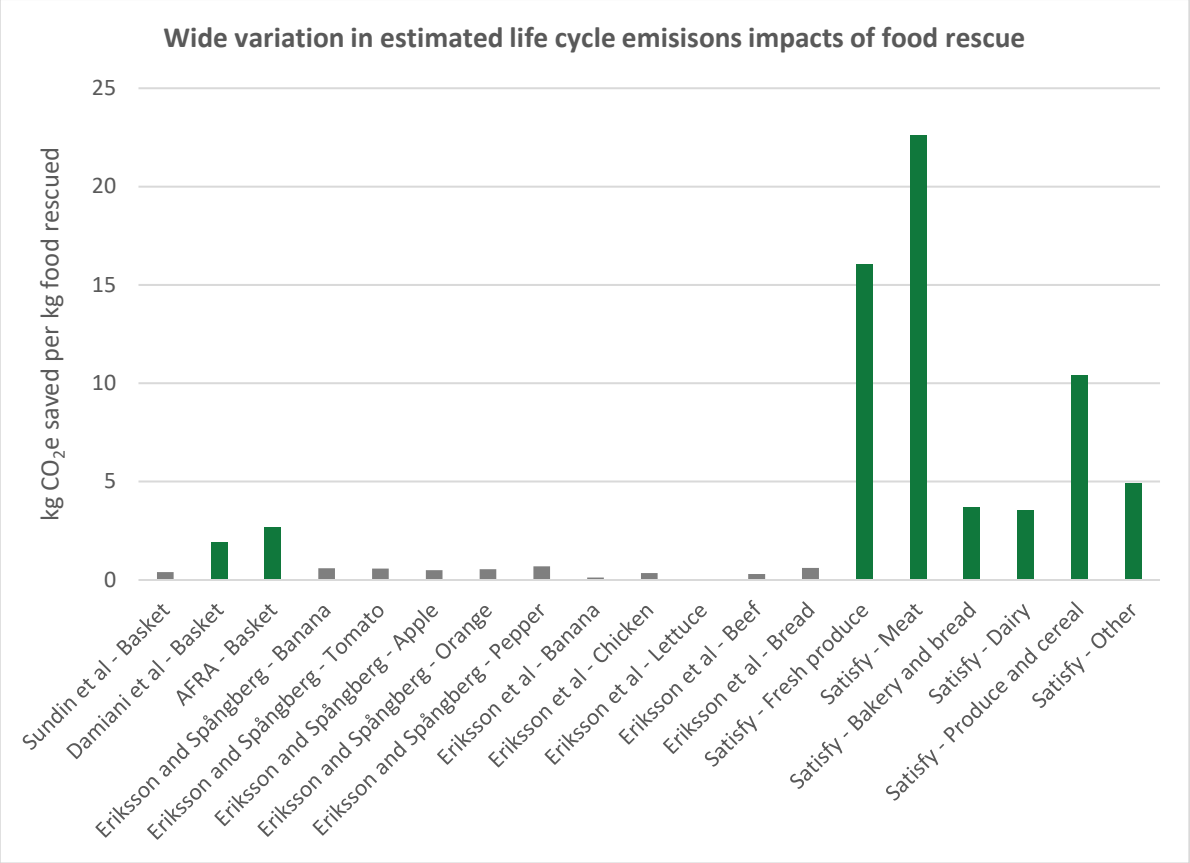

Figure 20: Bar chart showing CO_2e savings achieved by food rescue, as estimated by different studies. The three bars on the left are derived from studies that provided a combined figure for a collection of food items, while the bars to the right are broken down by food item. Dark green bars are derived from studies where the authors assume that rescued food replaces the need to produce an equal amount of identical food, while grey bars make more conservative assumptions. See annex 1 for full details for each study.

Many food rescue organisations in Aotearoa claim that every kilogram of food rescued prevents 2.65 kg of carbon dioxide equivalent (CO_2e) from being emitted,[222] using a life cycle assessment approach that was developed by WasteMINZ using UK data on the emissions associated with food production, modified for the New Zealand context.[223] This figure attempts to arrive at an average emissions figure regardless of the food type rescued, and does not account for the emissions associated with the process of collecting, storing, and distributing rescued food. Life cycle assessments of the rescue sector's carbon impact in the peer reviewed literature have yielded lower figures,[215-219] while a study conducted for Satisfy Food Rescue yielded higher figures,[224] with variation depending significantly on assumptions and methodology.

One of the main methodological challenges underpinning life cycle assessments of the emissions impact of food rescue or other food recovery or management alternatives is the question of substitution. That is, what are we assuming the rescued food is replacing? One assumption is that rescued food replaces the need to produce an equal quantity of equivalent food, given demand is satisfied using rescued food.[219,223-225] The significance of this assumption is highlighted by Eriksson et al. (2015),[216] who explore three replacement scenarios: one where the replacement is like-for-like ('original food' scenario), one where rescued food replaces a calorically equivalent volume of bread ('bread' scenario), and one where recipients of rescued food instead go hungry ('nothing' scenario). Figure 21 highlights the sensitivity of emissions modelling to the replacement assumption.[216]

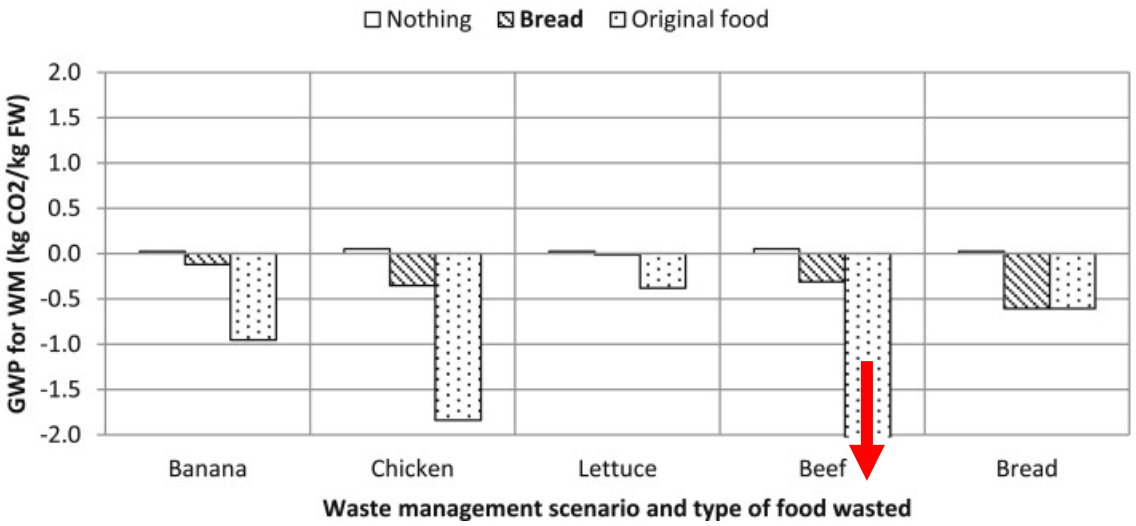

Figure 21: Global warming potential of food rescue from Eriksson et al. (2015),[216] with arrow added by OPMCSA. This figure highlights the sensitivity of emissions calculations to assumptions made in modelling. In this figure, assumptions relating to what rescued food is replacing (and therefore the production of what food products is averted) are tested. Scenarios where the GWP value is negative contribute to climate mitigation, while those where the GWP value is positive contribute emissions. **NB: The beef bar extends beyond the graph, to −26 kg CO2e/kg of food for the 'original food' scenario, indicated by the red arrow.** Abbreviations: FW = Food Waste; GWP = Global Warming Potential; WM = Waste Management. Image credit: Eriksson et al.[216]

Another complexity associated with pinning down a figure is the varying emissions profiles associated with the production of different food types. For example, using a like-for-like substitution assumption, the emissions savings associated with rescuing meat are generally significantly greater than those associated with rescuing other foods.[219] The assessed emissions impact for rescuing different food types also depends on where that food was produced, given the impact this has on associated emissions from production and transport. In Aotearoa, rescued food is often produced overseas.[184] While it is simpler to use a single figure to describe the average amount of CO_2e emissions avoided per unit of food rescued, this misses the wide variation in the emissions profile of different food products. Satisfy Food Rescue uses a model that breaks down the life cycle emissions of food products by food type (see annex 1),[176,224] an approach that could be considered for wider use in the sector, particularly in light of AFRA's new data reporting requirements that require rescue organisations to report volumes by food category (see section 3.1). The Satisfy Food Rescue model also covers the water footprint of the rescue sector (see later in this section and annex 1).[24,219]

While it is simpler to use a single figure to describe the average amount of CO_2e emissions avoided per unit of food rescued, this misses the wide variation in the emissions profile of different food products.

In addition, the emissions produced by the rescue sector can't be ignored in a net emissions assessment of the sector's impact – but current figures used in Aotearoa don't take this side of the emissions equation into account (see annex 1). We haven't identified any studies exploring the emissions produced by rescue sector operations in the New Zealand context, which would likely vary widely between rescue organisations depending on the scale and nature of their operations. While rescue organisations often aspire to invest in low-emissions infrastructure and equipment, funding constrains this (see section 5.2).

A final complexity associated with conducting life cycle assessments of the rescue sector's impact is deciding what to compare the emissions impact of food rescue against. In the peer-reviewed literature, a range of different approaches have been taken. For example, the sector's impact has been compared against all food waste management tiers of the waste recovery hierarchy,[216] a select tier or tiers of the hierarchy,[217,218] a country's current mix of waste management practices,[219] and prevention of food waste.[215] If a life cycle assessment of the rescue sector's impact is conducted in the New Zealand context, it would be useful to compare the sector's emissions impact with the impact with our current mix of non-rescue surplus food management practices (of which landfilling is likely only a small portion, see section 5.1), as well as making an aspirational comparison with complete source prevention.

Given that models seeking to calculate the environmental impacts of food rescue (and other food waste management strategies) are highly dependent on assumptions, clarity around underpinning assumptions will help with transparency, and enable the environmental positives associated with food rescue to be accurately represented and consistently compared to other waste management alternatives. There are also fundamental disagreements over the appropriateness of life cycle assessment approaches for measuring the climate impact of the rescue sector if rescue is viewed as a form of marginal abatement assessed through an end-of-life lens.

… clarity around underpinning assumptions will help with transparency, and enable the environmental positives associated with food rescue to be accurately represented and consistently compared to other waste management alternatives.

Given food rescue prevents greenhouse gas emissions, could rescue organisations earn NZUs?

It is unlikely that food rescue organisations could earn carbon credits, known as New Zealand Units (NZU), in the Emissions Trading Scheme (ETS). The ETS is a system designed to contribute to the reduce emissions across the economy by allowing greenhouse gas emitters a limited number of NZUs, which must be surrendered based on their emissions. NZUs can be earned by activities which sequester carbon, predominantly tree planting by forestry operators.[226,227] While a life cycle lens reveals that food rescue organisations prevent emissions if rescued food is assumed to replace the production of new food, food rescue doesn't directly sequester carbon, which is required for inclusion in the ETS as an earner of NZUs. To our knowledge, no country specifically includes food rescue or food waste in their approaches to emissions trading.[228]

However, promoting food rescue could theoretically form part of an ETS emitter's response to operating within the ETS, particularly for landfill operators. To limit the required number of NZUs surrendered, a landfill operator could invest in initiatives that reduce the amount of organic material that they send to landfill, including through supporting food rescue. This would reduce their biogenic methane emissions and therefore lower the number of NZUs they would be required to surrender, provided they are able to provide data demonstrating the composition of their landfilled waste.[229]

What about voluntary carbon markets?

Verra, a not-for-profit organisation that develops Verified Carbon Standards for use in voluntary carbon markets, published a methodology for calculating emissions savings associated with keeping food in the human supply chain.[230,231] The methodology can be used by companies undertaking projects to combat food waste – including food rescue – to calculate the net emissions savings achieved and participate in voluntary carbon markets. The methodology outlines the project

specifications and data requirements that would enable a company to prove its project contributed to a certain amount of emissions savings – including a requirement to characterise the emissions associated with both the baseline scenario and the project scenario. Due to the methodological complexities of life cycle calculations, as well as debate around whether a life cycle approach is an appropriate way to measure the rescue sector's impact, the standard only currently includes averted end-of-life emissions.

While voluntary carbon markets can play a role in climate action, claims must be evidence-based if they are to genuinely contribute to climate change mitigation. MfE has released interim guidance for organisations wanting to engage in voluntary carbon markets, emphasising the following principles:

1. Information on the mitigation must be transparent, clearly stated, and publicly available
2. Mitigation must be real, measurable and verified
3. Mitigation must be additional to business-as-usual activity
4. Mitigation must not be double used (i.e. the same units counted by different organisations, or the same units claimed in mandatory and voluntary carbon markets)
5. Mitigation must not result in leakage of emissions elsewhere
6. Mitigation must be permanent.[213]

Any efforts to include food rescue in voluntary carbon markets in Aotearoa should bear these principles in mind.

Food rescue also saves water, but again, the exact water footprint is hard to pin down

Food rescue also saves water when a life cycle lens is applied, although the extent of this is hard to determine. The same issues seen with determining emissions also apply to water. When undertaking a life cycle assessment, the amount of water saved is largely dependent on the type of food rescued, and where it was produced. With the diverse nature of the food rescued, arriving at a single figure to represent the water savings contributed by the sector is challenging, and potentially misleading.

AFRA reports that 830 L of water are saved for every kilogram of food rescued. This value was determined through conversation with ReFed, a US-based non-profit committed to combatting food waste. [222] Meanwhile, Satisfy Food Rescue use figures calculated using a global supply chain database, to estimate the amount of water required to produce different food products, and arrived at much larger numbers than those used by AFRA – between approximately 3,000 L and 24,000 L of water per kilogram of food rescued, depending on the food type.[224] As with measuring the sector's emissions impact, greater transparency and validation of methodologies used to report the sector's water impacts would be valuable.

… greater transparency and validation of methodologies used to report the sector's water impacts would be valuable.

4. Food safety in the rescue ecosystem

Ensuring that food is safe for recipient communities is a core part of the rescue sector's work. Everyone has a right to be confident that the food they are eating is safe, regardless of whether that food is purchased or donated. People who receive donated food rely on the practices of those who donate and distribute food to keep them safe from microbiological, chemical, physical, or allergen-related harms from food. Good food safety practices in the rescue sector protects recipients and gives confidence to donors that food safety risks downstream of their donation are being appropriately managed. The safety and suitability of rescued food is also crucial to respecting the recipients of rescued food.

Good food safety practices in the rescue sector protects donor recipients and gives confidence to donors that food safety risks downstream of their donation are being appropriately managed.

4.1 Safe food doesn't cause illness or injury

Safe food is food that, when eaten as intended, doesn't cause illness or injury.[232] This means it is free from dangerous levels of:

- Microbiological hazards – Microorganisms, including bacteria, fungi, parasites, prions, and viruses, that can be present on or in food products and, if consumed, can lead to infection and illness. While frequently associated with animal products, microbiological risks exist for a wide variety of food products – for example, in Aotearoa in 2019 a salmonellosis outbreak was strongly linked to alfalfa sprouts and another was strongly linked to flavoured water,[233] and in 2012 a widespread salmonellosis outbreak was linked to consumption of hummus made from contaminated tahini.[234] In Germany in 2011, around 3,000 people became infected after eating *Escherichia coli*-infected sprouts, with 53 people dying.[235]
- Chemical hazards – A wide range of naturally occurring and manmade chemicals that can get into the food supply chain accidentally or deliberately. Common examples of chemical hazards include mycotoxins, algal toxins, and environmental contaminants.
- Physical hazards – A wide range of naturally occurring and manmade materials that can cause injury if eaten. Naturally occurring physical hazards include things like stems and dirt, while manmade materials include things like plastics, glass, and needles.

Food doesn't have to be free from allergens to be safe, but any allergens must be declared to avoid harming people for whom certain foods can cause an adverse immune reaction leading to illness or death, and cross-contamination or the unintended presence of allergens must be avoided.

There are many people involved in securing the safety of food. The end consumer has a role to play, as does everyone upstream of them involved in the production, processing, manufacturing, packaging, distribution, retailing, and preparation of food. The actions of people throughout the food system can mitigate or exacerbate food safety risks and need to be managed. In order to provide safety and quality assurance and enable corrective action (e.g. recalls), the traceability of food as it moves through the hands of multiple people in the supply chain is crucial.[236,237]

4.2 Food safety laws don't apply in the rescue sector

In Aotearoa, businesses or individuals who routinely sell food must comply with the *Food Act 2014*[232] or the *Animal Products Act 1999*,[238] and food composition and labelling requirements are regulated under the Australia New Zealand Food Standards Code.[239] The regulatory context governing food

safety in Aotearoa aims to ensure that food safety risks are managed by commercial entities, through a food control plan or national programme for businesses subject to the *Food Act 2014*, or a risk management programme under the *Animal Products Act 1999*.[c]

The safety of food that isn't traded, including food once it has been donated to the rescue sector, is unregulated in Aotearoa, but the microbiological, chemical, physical, and allergen-related food safety concerns that the law aims to protect against are real outside of the commercial context too. Safe food practices in the food rescue context are adopted voluntarily. Being unregulated doesn't mean food rescue is inherently unsafe – but it does mean that questions regarding traceability, liability, and responsibility are less straightforward than in the commercial sector.[240]

As with Aotearoa, food rescue organisations in Australia and the US aren't subject to food safety laws if the food is distributed to recipients for free. Contrastingly, in the UK any organisation providing food on a regular and organised basis is considered to be a food business under UK law and is required to register and comply with food safety rules,[241] an approach that is common in EU countries as well[242] (see annex 3).

People in the rescue ecosystem prioritise food safety, seeing it as a duty of care

Despite the fact that food charities in Aotearoa are not subject to food safety laws, people throughout the food rescue ecosystem recognise the importance of ensuring the safety and suitability[d] of the food that is provided, with AFRA's *Food Safety Guide* describing it as a duty of care,[144] food rescue organisations identifying the central importance of food safety to maintaining the sector's social licence to operate,[144] and donors taking precautions when considering the condition of their donated food.[5]

… people throughout the food rescue ecosystem recognise the importance of ensuring the safety and suitability of the food that is provided …

4.3 Food safety starts with the donors

The condition in which food is donated to the rescue sector, the instructions provided with that food, and the way that food is handled as it's prepared for donation significantly reduce the risk of food safety issues arising.

The Good Samaritan clause clarifies liability for donors, but isn't perfect

When regulated food businesses donate food, they interface with the unregulated charitable context (see figure 3). Section 352 of the *Food Act 2014* serves to resolve ambiguity regarding the donor's liability for food safety concerns that may arise due to downstream handling of donated food. It absolves them from liability, so long as the donated food was safe and suitable at the time of donation and is accompanied by the information required to keep it safe.

[c] The *Animal Products Act 1999* covers the primary production of dairy, meat, fish and poultry products, honey, eggs, and even insects – primary production being the growing, harvesting, and initial processing of the animal. After primary processing, animal products can either remain with businesses operating under the *Animal Products Act 1999* or be transferred to businesses operating under the *Food Act 2014*.

[d] Along with safe food, as described in section 5.1, suitable food is defined in the *Food Act* 2014. Safe food, when eaten as intended, doesn't cause illness or injury, while suitable food meets composition and labelling requirements and is in the condition the consumer expects it to be. In the *Animal Products Act 1999*, the equivalent terminology is "fit for intended purpose."

Section 352 of the *Food Act 2014*, colloquially called the Good Samaritan clause, is copied below:

> **Immunity of food donors**
>
> (1) A donor is protected from civil and criminal liability that results from the consumption of food donated by the donor if—
>
> (a) the food was safe and suitable when it left the possession or control of the donor; and
>
> (b) as applicable, the donor provided the recipient with the information reasonably necessary to maintain the safety and suitability of the food.
>
> (2) In this section, donor means a person who donates food—
>
> (a) in good faith for a charitable, benevolent, or philanthropic purpose; and
>
> (b) with the intention that the consumer of the food would not have to pay for it.[232]

Similar legislative tools exist internationally (see annex 3 and Giuseppe et al.),[243] with the first such tool introduced in the US in 1996, where it covers both donors and charities distributing donated food.[244] Despite the Good Samaritan clause indemnifying donors, food safety concerns that may arise following a donation are cited as a reason for not donating,[5,62] reflecting a lack of confidence among prospective food donors in understanding the repercussions they could face if food safety issues eventuate from food that they donate.[62]

… food safety concerns that may arise following a donation are cited as a reason for not donating …

While the Good Samaritan clause protects a company from liability, reputational concerns come into play as well – a company's reputation could be damaged if food it donated led to food safety issues due to factors occurring downstream of its donation.[16,200,243] Semi-structured interviews with 16 retail staff in Aotearoa identified reputational risks associated with food safety concerns as a barrier to donation.[5] The reputational factor was summarised in a scientific opinion on food safety in the context of food donations, prepared for the European Commission in 2018.

> Food safety risks "…discourage food companies and retailers from donating for fear that incorrect handling and/or storage could lead to a well-publicised outbreak associated with a particular food brand and retail outlet/chain. This would damage sales and adversely affect the corporate image of the company even though the food safety issues arose in a part of the food chain that was not under their control."[200]

Addressing reputational concerns requires a prospective donor to have confidence in the food safety practices of the downstream recipient organisations,[204] which can be facilitated through, for example, enhanced food safety training provided by the food business to the rescue organisations it works with,[200] clear safety guidelines for the rescue sector, and resources to enable the rescue sector to enact those guidelines (see section 4.4).

In addition, the Good Samaritan clause only applies if food is donated with the intention that the consumer of the food wouldn't have to pay for it. In Australia, even asking for a donation constitutes 'selling food.'[245] With rescue organisations in Aotearoa exploring ways to meet their operational costs, this aspect of the Good Samaritan clause could benefit from clarification. Similar problems have been identified in the US, with non-profit organisation ReFED recommending that the US

Department of Agriculture provide an authoritative interpretation of the clause and update it to ensure it still applies if not-for-profit recipients charge a small fee for the food they distribute.[246]

A further consideration associated with the Good Samaritan clause is that it only covers food businesses that operate under the *Food Act 2014* – there is no equivalent to the Good Samaritan clause in the *Animal Products Act 1999.*[238] Including an equivalent clause in the *Animal Products Act 1999* would align it more closely with the *Food Act 2014*, mitigating the risk of legal liability concerns stymying the donation of meat (which is among the least common food types currently received by the rescue sector, see figure 18) and other animal products from people operating under the *Animal Products Act 1999* and not the *Food Act 2014*.[e]

… there is no equivalent to the Good Samaritan clause in the *Animal Products Act 1999*.

Commercial food donors can go beyond 'safe and suitable'

While donating 'safe and suitable' food will protect a commercial food donor, there's more that they can do to promote food safety in the rescue sector. Examples of practices donors can employ to promote food safety downstream of their donation are provided below. Close relationships and clear communication between rescue organisations and donors (as described in section 5.5) underpin food safety in the rescue sector too.

Timing of product donations

AFRA's *Food Safety Guide* for rescue organisations provides rescue organisations with clear guidance on how to interpret date labels and when food should be rejected[144] (see section 4.4 and annex 2 for more on the *Food Safety Guide*). However, if donors optimise the timing of their donations the burden on food rescue organisations is reduced, and the volume of food that rescue organisations or downstream recipients have to reject and find alternative use or disposal options for would be minimised. In Australia, it has been estimated that rescue organisations have to deal with 6 kg of food waste per tonne of food rescued.[2] With the rollout of AFRA's new data collection requirements (see section 3.1), a figure for the New Zealand food rescue sector will be available in the year ahead, and will enable ongoing learning and strengthening of donation practices to ensure the safety and suitability of food provided to the rescue sector. However, this won't capture food waste that occurs downstream of rescue organisations (e.g. at recipient organisations or in recipient homes). Additional research would be needed to gather this information.

While the Good Samaritan clause focuses on the safety and suitability of donated food at the time of donation, donated food often can take a day or more to reach recipients, depending on the rescue and distribution model. Donors can support food safety by ensuring donated food will still be safe and suitable a day or more after donating. In France, donors are required to ensure donated food products have at least two days of available shelf life remaining when donating to a foodbank or other charity.[200] In a softer approach that enables more context specificity, WRAP (a UK organisation committed to sustainability and climate action) recommends that food donors and rescue organisations work together to determine the acceptable number of

In France, donors are required to ensure donated food products have at least two days of available shelf life remaining when donating to a foodbank or other charity.

[e] E.g. if a farmer or hunter donated meat direct from an abattoir operating under the *Animal Products Act 1999*.

days beyond a product's best-before date that a rescue organisation can accept, and has produced an agreement that donors and rescue organisations can sign to ensure they have a mutual understanding on this point.[247]

Commercial food businesses understandably want to maximise their chances of selling products, so determining the timing of product donations can be a challenge – too soon and they may miss a chance to make a sale, too late and the food may no longer be safe and suitable for the rescue sector. Models for determining the optimal stock withdrawal strategy for food retailers in the New Zealand context could be explored.[243]

Freezing and re-labelling products

Freezing food before its use-by date or within a product-specific window after the best-before date can serve as a 'pause button' on a product's deterioration, keeping it safe and suitable for longer and giving rescue organisations more time to distribute it.[144,200] Freezing is particularly useful for meat, which can otherwise enter decomposition (particularly for raw meat products) or become microbiologically unsafe (particularly for cooked meat products).[144] The commercial food sector is generally better resourced and equipped to freeze products than the rescue sector, so would ideally take responsibility for this.

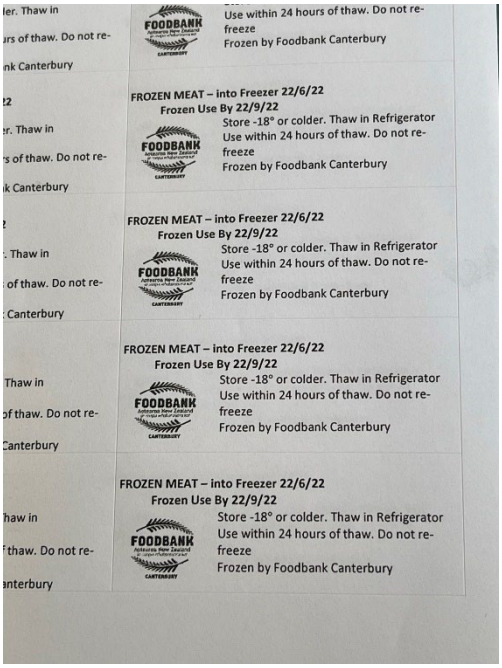

Figure 22: Sheet of frozen meat labels used by Foodbank Canterbury.

In a scientific opinion on food safety in the context of donated food in the EU, the authors advised that donated foods that are frozen should be relabelled – with the date of freezing and instructions to eat immediately upon thawing – by whichever operator does the freezing, be it the donor or the recipient organisation,[200] with advice to relabel frozen food also echoed in the UK context.[248] Using extra labels to identify when a donated product was frozen, when it should be eaten by, and advising recipients to use immediately upon thawing would promote food safety in the rescue sector.[204] There are already examples of this practice occurring in Aotearoa. For example, Foodbank Canterbury adds a 'use within' sticker to frozen meat (see figure 22).[158] Freezing is just one approach to extend shelf life. Others, such as freeze drying and high-pressure processing, can also be applied. These techniques have the potential to contribute to food waste prevention and will be covered in later reports.

There are some donation grey zones for commercial food businesses

While current guidance on food donation covers a vast number of scenarios and cases, there are some donation categories for which guidance is lacking, ambiguous, or inconsistent. Two examples are provided below.

Surplus catering food

Caterers can donate surplus food to rescue organisations and are covered by the Good Samaritan clause so long as the food was safe and suitable when they donated it and they provided the recipient with the information necessary to maintain the safety and suitability of that food.[232] Caterers can largely only vouch for the safety and suitability of pre-consumer food (i.e. food that has

been kept in reserve), with food that has been on display or served having left a controlled environment (see annex 2 for further details). In situations where a donation of catering surplus is made by a catering customer operating outside of the *Food Act 2014* (rather than the catering business itself), neither the catering company nor the donor would be liable for any downstream food safety concerns given this activity exists outside of the *Food Act 2014*.

We don't have wide visibility of practices across the food rescue sector regarding catering surplus, nor do we know how often caterers donate – although Air New Zealand donates surplus catering from its operations to NZFN[206] and some caterers partner with rescue organisations too, although their focus is often on surplus prevention, so opportunities to donate aren't common.

Figure 23: Surplus food from an event. Image credit: Simon Kingham.

Catering surplus isn't covered in AFRA's *Food Safety Guide*. But in a 2014 Kaibosh guide for the food rescue sector, they noted that they rarely accept restaurant and catering food because of handling, safety, and storage complexities. Kaibosh only accepts catering that has been prepared in a commercial kitchen, and before it has been served to customers (e.g. before going onto the buffet table).[249]

Given the logistical complexities of handling catering surplus, it is likely that rescue organisations that provide meals directly to people in need (i.e. mixed-model organisations described in section 2.4) are better equipped to receive and distribute food of this kind.

Internationally, practices and the clarity of guidance varies. Clear guidance on catering waste from any country is uncommon, often described as being something to consider on a case-by-case basis.[250] However, in Hungary there is explicit guidance not to donate catering food that has been served.[251] Meanwhile, in the US several rescue organisations have facets of their operations dedicated to rescuing catering surplus. For example, Community Food Rescue in Maryland proactively partners with catering companies so that surplus catering food can be captured, facilitated by an app called ChowMatch that alerts volunteers when food is available for collection.[252]

… Community Food Rescue in Maryland proactively partners with catering companies so that surplus catering food can be captured, facilitated by an app called ChowMatch that alerts volunteers when food is available for collection

Withdrawn and recalled products

Food product recalls are issued for safety reasons or reasons relating to a product's suitability for sale (e.g. labelling error). Separate from recalls, withdrawals can be issued, where the food is neither unsafe nor unsuitable, but some other error has occurred such that the food business doesn't want its product to be sold (e.g. wrong coloured lid). Recalls can occur at the consumer level (where consumers will be asked to return products, and the product will be removed from other stages of the supply chain) or trade level (where products will be removed from the supply chain).[253] This year to 20 September 2022, there have been 37 consumer level recalls in Aotearoa, the vast majority of

which related to labelling errors with possible food safety implications (e.g. wrong date label, undeclared allergens).[254]

AFRA's *Food Safety Guide* tells donors not to donate food that is subject to a current recall notice.[144] However, not all recalled products are inherently unsafe – they may have been recalled for suitability reasons – or they can be made safe through corrective labelling (e.g. to fix an incorrect use-by date or add an allergen declaration). A blanket rejection of all recalled items is inconsistent with the ability to donate mislabelled products if identified pre-retail and provided with the necessary corrective information. However, the impact of allowing recalled products to be donated on the dignity of recipients would need to be considered if this inconsistency was to be addressed, and the rescue of recalls returned by consumers should be scrutinised as the verifiability of safety diminishes once food has been taken out of a regulated context. We aren't aware of any guidance relating to withdrawn products.

It's hard to be confident that food is safe if it comes from non-commercial donors

For food that exists entirely outside the commercial space and therefore is never subject to regulations aimed to promote food safety, there are ambiguities and variable practices regarding whether it can safely be received into the rescue sector. Examples include the donation of home-cooked meals and baking, jams and preserves, and homekill and recreational catch.

In these situations, certainty that the food has been prepared, handled, stored, and transported safely is reduced, and the people involved in the preparation and provision of this food aren't legally required to manage food safety risks. This means that, from a rescue organisation's perspective, accepting and distributing food products received from outside the commercial sector and without the ability to guarantee the safety of the food may compromise the duty of care they have to their recipient communities. However, not all foods present equal food safety risks. For example, surplus produce donated from someone's garden should carry less risk than meals, baking or preserves prepared by someone who is not aware of the risks their food might pose to people they don't usually cook for, or wild game caught and processed by an unlisted hunter (see examples below and annex 2 for details).

For food that exists entirely outside the commercial space and therefore is never subject to regulations aimed to promote food safety, there are ambiguities and variable practices regarding whether it can safely be received into the rescue sector.

Homekill and recreational catch

The *Animal Products Act 1999* is the main law relating to the production and processing of animal material and products,[238] including homekill and recreational catch (e.g. fish, wild game). The *Animal Products Act 1999* and associated homekill and recreational catch guidelines are ambiguous regarding whether it's acceptable to donate or accept homekill and recreational catch.[255] While these products aren't allowed to be traded but are okay for the farmer or hunter to eat and share with specified individuals at their own risk, the *Animal Products Act 1999* and guidelines are silent on whether they can or should be donated, and the current AFRA *Food Safety Guide* developed with MPI advises food banks against accepting homekill (see section 4.4 and annex 2). In practice, recreational hunters and fishers are increasingly donating catch to the food rescue sector (e.g. through Kai Ika[57] and the Sika Foundation),[256] and Meat the Need, a charitable organisation through which farmers can donate animal products to food banks, is looking at how home kill animals can be

safely supplied to communities in need, which would provide a way for healthy casualty animals to be donated.[257,258]

For unregulated meat that exists outside the commercial food sector, food safety risks exist – including parasitic, bacterial, and viral risks that need to be managed during harvest, dressing, storage, or preparation.[259,260] Veterinary compounds (e.g. antimicrobial drugs) may also be present in homekill animals, and pest control toxins in wild animals. MPI has already supported the Sika Foundation with advice about donated recreational catch,[256] but this could be expanded and made more readily available to the rescue sector and prospective donors. Development of guidelines for homekill and recreational catch donations from outside the commercial sector would be valuable to support risk management and evidence-based guidelines as farmers and the recreational hunting and fishing communities increasingly seek to support community food organisations with donations. In addition, measures to enable meat to enter the regulated meat system more readily (instead of being regarded as homekill or unregulated game) could be explored, such as investment in local or mobile facilities.

In contrast to recreational hunters, commercial hunters are required to pass a food safety test. Listed hunters can supply meat to regulated meat processors, ensuring food safety standards are adhered to. Wild game that has been caught by a listed hunter and processed by a regulated meat processor is deemed safe to be traded, with food safety risks appropriately managed. Therefore, there is no ambiguity about donations of commercially harvested game – although the donor isn't protected from legal liability due to the absence of a Good Samaritan clause in the *Animal Products Act 1999* (see earlier in this section).

Home-cooked meals, baking, jams, and preserves

AFRA's *Food Safety Guide*, developed with support from MPI, advises members against accepting food prepared at home[144] – i.e. by individuals operating outside the regulated food system who aren't required to formally manage food safety risks through a food control plan or national programme.

Figure 24: Homemade jam. Image credit: Max Goncharov on Unsplash.

Home prepared foods introduce safety concerns that go above and beyond the donation of other foods such as surplus garden produce (which is not risk free, but generally lower risk). For example, *Clostridium perfringens* is a bacterial risk associated with meat dishes than have been cooled too slowly,[261] while *Clostridium botulinum* is a bacterial risk associated with low-acid canned or bottled foods, both of which can cause food poisoning[261,262] (see annex 2 for further details). While botulism is extremely rare (only four reported events affecting ten people in Aotearoa from 1984 to present, primarily associated with improperly preserved seafood),[263-265] it can be fatal if not diagnosed and treated with anti-toxin rapidly.[266] In the US, of 405 botulism events between 1950 and 2005, 92% were linked to home-processed foods.[262]

Deciding what constitutes an acceptable level of hard-to-manage risk in the rescue sector is a challenge, particularly in the context of the recipients' vulnerability – the food access options available to people who are food

Deciding what constitutes an acceptable level of hard-to-manage risk in the rescue sector is a challenge, particularly in the context of the recipients' vulnerability …

insecure are constrained.[267] With practices in the rescue sector varying on the acceptance of home-prepared foods, it would be valuable to consider risk and risk management for this category of donations in future food safety guidance for the rescue sector.

4.4 Rescue organisations need to be resourced to secure food safety

Once food leaves the hands of the donors, it becomes the responsibility of the organisation that receives it. The principles and guidelines related to the *Food Act 2014* are used to inform safe operation of the food rescue sector, with AFRA developing a food safety guidance document for the rescue sector, with support from MPI.[144] The AFRA *Food Safety Guide* is an example of the value AFRA provides to the food rescue sector, promoting best practice among its members to ensure the quality of the service provided to recipients and giving guidance and assurance to donors. MPI supported the AFRA initiative. However, its contributions were based on requirements for food businesses in the commercial sector, rather than from a detailed understanding of the charitable food sector model (e.g. understanding how voluntary organisations fund, source, receive, handle, and distribute food to those in need, and the associated food safety considerations). Gaining this level of understanding would require the work to be identified for inclusion alongside existing food safety work priorities with the commercial sector.[268] AFRA is currently updating the *Food Safety Guide* and intends to do so periodically, providing ongoing opportunities to strengthen the resource.[154]

The AFRA *Food Safety Guide* is an example of the value AFRA provides to the food rescue sector, promoting best practice among its members to ensure the quality of the service provided to recipients and giving guidance and assurance to donors.

Adherence to the guidelines is optional,[144] and is contingent on resource availability (e.g. chilled food rescue trucks, temperature controlled storage). The aggregate of transport and storage infrastructure available to the food rescue sector hasn't been studied, but is crucial to the sector's safe operation (see also section 5.2).[151] With the oversubscribed Waste Minimisation Fund currently only providing funds for step change waste minimisation initiatives rather than operational costs,[149] it's not clear that rescue organisations can apply for funding to cover these kinds of investments, although in the past some applicants have been successful.[145] Adherence to food safety guidelines also depends on the awareness and commitment of food donors and food rescue sector volunteers, for whom food safety may not be something they have formal training in.[204] Thus, organisations like AFRA, with support from experts, play a vital role in supporting food safety in the rescue sector.

The guidelines in some places err on the side of caution, reflecting awareness of the heightened safety concerns associated with certain food products (e.g. chicken, seafood, shellfish, home prepared products, unregulated meat).[144,261] Some of these food safety risks may be manageable with strengthened training and resourcing to support food safety in the rescue sector, potentially enabling more food to be rescued[204] (see annex 2).

We aren't aware of New Zealand-specific research looking at the food safety practices of people throughout the rescue sector or exploring the safety of food products as they move through the system. A 2017 case study of the Belgian food charity sector combined qualitative research into food safety practices and quantitative research into the microbiological safety of donated food, to identify the safety performance of the sector and opportunities for improvement.[204] It found that the donation/acceptance chain is far less structured and organised than the conventional food supply

chain. The authors noted that harmonised and unambiguous guidelines for the rescue sector would be valuable and observed that volunteer food safety training and sufficiency of refrigerated transport and cold storage were important enablers of rescue capacity and donor trust (see section 5). Microbiological analysis of 72 rescued perishable food samples in the Belgium case study found that 22 out of 72 had marginal microbiological quality (as measured by yeast, lactic acid, or total viable count). Of food safety concern, *Listeria monocytogenes* was detected at relatively low levels in three products, low levels of *E. coli* were detected in two products, and one ready-to-eat cooked meat product carried high levels of *Enterobacteriaceae*, and *L. monocytogenes* in excess of the legal allowance.

A study of this nature would be valuable in New Zealand and aligns with New Zealand Food Safety's 2022 food safety science plan, which proposes to invest up to $9 million/year in research that will strengthen our understanding of known food safety risks and assess the efficacy of management approaches to reduce the level of risk.

Existing guidelines for the New Zealand food rescue sector are predominantly applicable for a food rescue context in which food is minimally reprocessed. If the food rescue sector incorporates more cooking and processing into its work, further guidance and training will likely be needed given the additional food safety considerations this introduces (e.g. hygiene during cooking, cooling practices, reheating instructions for recipients).

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4.5 Recipients of rescued food are a crucial link too

While those upstream of the recipients of rescued food have a duty of care to ensure the food they provide is safe, recipients themselves also have a role to play,[204] particularly given that MPI estimates that half of all food poisoning cases result from infections that occur in the home.[269] The importance of strengthening this link in the food safety chain is recognised in New Zealand Food Safety's 2022 food safety science plan, which proposes to invest up to $6 million/year in research that will help to improve consumer and food server food safety practices.[270] With rescued food often having limited remaining shelf life and the food received potentially being unfamiliar or unexpected given the variable nature of surplus food flows, food safety risks in the home may be exacerbated in this context.

Research into food safety awareness and practices in New Zealand homes suggests that we have much room for improvement. A 2021 survey in which participants were asked about their practices when handling raw chicken found that the mean score for food safety was 9.8 out of a possible 21 points (range 2 to 19).[271] A similar study in 2007 looking at household practices relating to meat and poultry found that only just over half of participants reported that they followed hand washing practices that would reduce the risk of cross-contamination, and 41% and 28% would use knives and kitchen surfaces in a way that would enable cross-contamination, respectively.[272] In addition, a 2013 study found that "habits and lack of knowledge concerning food safety during domestic food preparation are prevalent among consumers."[273]

New Zealand-based studies have shown that learning to cook in a structured training environment has been found to correlate with better food safety knowledge and reported practices,[271] and in a survey-based study the majority of participants viewed food safety information on fresh chicken products as very necessary or essential.[274]

… learning to cook in a structured training environment has been found to correlate with better food safety knowledge and reported practices …

Leveraging these insights in the context of food rescue, a case can be made for ensuring that recipients have access to the necessary information required to handle the food they receive safely (e.g. as with Foodbank Canterbury's 'use within' sticker for frozen meat, see figure 22). In addition, access to community cooking classes could bolster food safety in the home. An example of a community cooking class is WELLfed in East Porirua, which runs free classes with an emphasis on nutrition, affordability, food safety, and community building, using food rescued by Kaibosh.[275]

Recipes for the use of unfamiliar foods can also bolster safety in the home and reduce the risk of food being wasted by recipients because it is unfamiliar or difficult to use.[121] For example, when the Fiordland Wapiti Foundation, Game Animal Council, and DOC partnered to recover and process culled deer to venison mince for food banks (see case study 14), they also partnered with chefs and local iwi to design recipes for recipients.[59]

5. Ingredients for success in the rescue sector

Alongside the crucial importance of promoting food safety in the rescue sector (see section 4), a number of other factors can support a thriving food rescue sector that is able to capture as much surplus food as possible and distribute it to people to eat instead of to lower tiers in the food recovery hierarchy.

5.1 Economic barriers to donation need to be addressed

Tax barriers to surplus food donation have been dismantled in other countries

To incentivise businesses in the food and beverage industry to donate surplus food rather than manage it at lower tiers of the food recovery hierarchy, financial barriers to donation have been dismantled in other jurisdictions. A 2020 Australian study noted that a failure to do so can mean "it is often more practical and cost effective for businesses to discard food rather than donate it."[276] However, Lohnes and Wilson (2017) argue that tax incentives for food donation contribute to the bedding in of wasteful food supply chain practices, with food redistribution charities serving as "overproduction safety valves."[277] This critique should be borne in mind to avoid producing perverse incentives through well-intentioned tax interventions.

Throughout much of the EU, donors are exempt from paying Value-Added Tax (VAT) on donated goods and several jurisdictions provide tax credits or tax deductions for food donation …

Throughout much of the EU, donors are exempt from paying Value-Added Tax (VAT)[f] on donated goods[243,278] and several jurisdictions provide tax credits or tax deductions for food donation[276] (see annex 3). In the US, the year following the expansion of tax incentives for surplus food donation saw a 137% rise in food donations across the country.[279] Two modelling studies focussing on retail food donation in Italy concluded that tax settings can support food donation by making it more economically attractive for businesses,[243,280] although a sense of corporate social responsibility and commitment to sustainability values also drive a preference for donation rather than other surplus management options.[2,5,281,282]

Businesses in Aotearoa are required to pay income tax, but not GST,[g] on the value of donated food – although anecdotally compliance with this requirement is low.[143] For food that is assessed to have no market value at the time of donation (e.g. it has passed its best-before date), no tax applies. However, if food is in a saleable condition, tax on the value of goods at the time of donation applies. This is a potential disincentive to surplus food donations and may also drive a preference towards donations of goods with limited remaining shelf life, creating donation management challenges for the rescue sector (see section 4.3). In addition, the GST exemption on donated goods is a double-edged sword for food rescue. While the exemption lifts a barrier to donation, it means that rescue organisations can't recover GST on any of their related expenses.

In the US, the year following the expansion of tax incentives for surplus food donation saw a 137% rise in food donations across the country.

[f] In Aotearoa, Goods and Services Tax (GST) is the equivalent of VAT.
[g] In Aotearoa, donated goods are GST-exempt.

With the advent of COVID-19, a temporary law change lifted the requirement for businesses donating trading stock to pay income tax on the value of donated goods.[143,283] This law change is in place until March 2023, and evaluation of its fiscal impacts and impacts on food donation volumes and practices would be valuable. Maintaining this temporary law change indefinitely for food and beverage businesses donating to the rescue sector would bring Aotearoa into closer alignment with comparator countries[250,276] and, based on international insights (see annex 3) and feedback that the Inland Revenue Department (IRD) has received from Federated Farmers, would be expected to support donations to the rescue sector.[143]

The rising landfill levy will help tip the balance, but can't do it alone

When any waste, including food waste, is sent to Class 1 landfills, the waste disposal levy applies, which is currently set at $30 per tonne (recently up from just $10 per tonne).[4,284] The levy will continue to be progressively increased to $60 per tonne by mid-2024, making it more costly for businesses to landfill their waste. It is hoped that this will incentivise waste prevention and other waste management options, including donation of surplus food. In 2014, Garrone et al. noted that "low tariffs for waste collection and treatment drive firms to confer surplus food to waste utilities, and discourage alternative uses of surplus food."[285]

On its own the rising levy won't guarantee an increase in surplus food donations.

On its own the rising levy won't guarantee an increase in surplus food donations. Firstly, even at $60 per tonne it is relatively low. In 2017, Eunomia assessed that a levy of $140 per tonne would be required to trigger real reductions in disposal.[286] Other countries have higher waste levies than us – for example, the Queensland government's waste levy is AU$85 per tonne for general waste in a metropolitan area, incrementally increasing to AU$145 in the 2027/28 financial year.[287] Adelaide's solid waste levy rates are currently AU$149 per tonne in metropolitan areas and AU$74.50 per tonne in non-metropolitan areas.[288]

Secondly, disposal of surplus food to landfill is relatively uncommon in the primary production, processing and manufacturing sectors, and in retail – most food waste sent to landfills in Aotearoa comes from households.[33,289] For example, a study looking at fruit loss in Central Otago found that harvested fruit loss is generally mulched into the orchard, composted, fed to animals, or dumped in pits on the orchard.[18] Meanwhile, a supermarket-based study found that only 23% of food waste from Countdown, New World, and Pak'nSave is sent to landfill, with the greatest proportion (46%) being used as animal feed and therefore not subject to the pressures of the increasing landfill levy.[5]

Finally, while the rising landfill levy reduce surplus food to landfill, it doesn't guarantee that surplus food will be rescued; it could be managed at another tier of the food recovery hierarchy, such as being diverted to animal feed.

Instead of relying on a landfill levy to push people to explore other options, some jurisdictions have reduction targets or bans on landfilling organic materials, including food waste. Because banning food waste to landfill has implications for combatting food waste that extend beyond food rescue, we will explore this in a subsequent report. In addition, experience in France suggests that the rescue sector needs resourcing to cope with an increase in donations ahead of a ban on landfilling edible food (see section 5.5).

Taking the final steps to get surplus food to hungry people can be a barrier

While time, money, and resource investments are generally concentrated early in the food supply chain and so have already been expended by the time surplus food exists, the final steps required to get surplus food to rescue organisations can be a hurdle. Costs associated with these final steps can be relatively small (e.g. the time and energy required to move surplus from a donor to a recipient) or much larger. Two examples of scenarios where the final steps in food rescue can serve as considerable barriers are explored in case studies 13 and 14 below.

Incentivising gleaning was identified as an effective way to combat food waste in an expert report presented to the Environment Committee in 2020[62] and reiterated as an opportunity to explore in the *Food Waste Reduction Roadmap* published following New Zealand's first national summit on food waste.[26] Gleaning could be incentivised in a range of ways, including exploring funding models, providing gleaners with resources, and incentivising farmer engagement.

In other countries, farmer engagement with gleaning initiatives is actively promoted, including at the government level. For example, in the US between 2014 and 2015, at least 12 states approved tax credits for farmers donating gleaned food,[290] and central government has an annual budget of US$4 million under The Emergency Food Assistance Program (TEFAP) to fund projects that involve harvesting, processing, packaging, and transporting food that would otherwise go to waste.[246] The EU food waste reduction programme (FUSIONS) and the UK's Gleaning Network have developed guidelines for gleaners and farmers to support the safe and effective operation of gleaning activities.[291,292] while fully funded through donations, Leket is a gleaning-focused food rescue organisation in Israel which manages to rescue approximately 10,000 tonnes of food each year, the bulk of which is agricultural surplus. A strong volunteer base and close relationships with farmers and logistics providers is crucial to Leket's success.[121,293]

Case study 13: Unharvested produce

Two New Zealand studies exploring horticultural food loss found that growers may choose to leave surplus produce unharvested to minimise their costs in the face of unfavourable market conditions.[18,25] This means that low grade produce or produce that is unlikely to turn a profit at market is left in fields, orchards, and glasshouses, rather than being harvested, processed, stored, and transported at a loss.[19] Retrieving surplus produce to donate to the rescue sector would come at a cost to growers. Working out how to bridge this gap, and at whose expense, would help prevent surplus produce from being left in the field. Tapping into this surplus stream could deliver considerable volumes of food to the rescue sector – in Central Otago alone, over 4,000 tonnes of fruit goes unharvested annually.[18] While some of this fruit is not suitable for consumption (e.g. rotten, diseased), much of it is unharvested for commercial reasons and is good to eat.

Figure 25: Citrus donated from a home garden. Image credit: Fair Food.

A leading solution to this challenge is the gleaning movement, where charities such as Perfectly Imperfect[294] and Community Fruit Harvesting[295] partner with farmers or people in the community with surplus produce, harvesting what would otherwise be wasted. They then sell it in secondary markets, process it to produce new products (such as jams, to extend shelf life), or donate it to people in need. Perfectly Imperfect pays a koha to the growers it collects produce from.

Case study 14: Recovery of wild animals from control operations

DOC controls wild animals on Crown land, including large browsing animals like deer, goats, and tahr.[148] Controlling wild animals alleviates browsing pressure, supporting biodiversity and climate objectives by enabling natural forests to regenerate and contribute to carbon sequestration.[296]

Figure 26: A red deer, one of the species of deer established in the wild in Aotearoa. Image credit: Diana Parkhouse on Unsplash.

A common technique for controlling large animals is hunting, meaning animals aren't poisoned and therefore are often safe to eat. DOC's framework for controlling wild animals acknowledges that commercial opportunities (e.g. sales of venison) and wild animal control objectives can be aligned, with contract hunters able to sell meat from wild animal management and control operations.[58,148] The costs associated with recovery of culled deer can be considerable, particularly the cost of helicopter time, to the point of being economically unfeasible at low deer densities and in forested environments.[58,297] But given conservation objectives are the priority of wild animal control and management activities, culling animals in terrain that isn't conducive to animal recovery is necessary.

With DOC increasing its wild animal control efforts, including with an injection of a further $30 m funding to support deer management and goat control over the next four years, the size of the recovery opportunity is likely to increase.[298] Exploring commercial avenues for the utilisation of culled animals is one option (e.g. Burger Fuel's venison burger, which is made using culled deer from Fiordland National Park and is marketed as rescued meat, as well as wild venison exports),[60] with another being exploration of recovering animals for use in the food rescue sector, where meat is one of the least common food categories currently available (see figure 18).

Working out who should fund the recovery, processing, and distribution of culled animals under a meat rescue model is a major challenge, particularly given that DOC's mandate and responsibilities are linked to conservation rather than food security. This challenge was overcome in a 2020 pilot prompted by the COVID-19 pandemic that saw the Fiordland Wapiti Foundation, Game Animal Council, and DOC partner to recover and process 600 culled deer from the Fiordland National Park, providing 18 tonnes of venison mince to people in need via South Island foodbanks.[59,142] DOC and the Game Animal Council are currently exploring the challenges and opportunities associated with meat recovery and wild animal control programmes, with a focus on the contexts and models under which it might be feasible.

For fee for service to be effective, the right timing and model would need to be found

Rescue organisations could cover some of their operational costs by charging donors a fee for the service of collecting and managing surplus food, either a flat fee or a fee related to the volume of food collected, as compared to the current state of play where food is received or picked up for free. For example, in France some rescue organisations charge food donors a commission, which is paid out of the tax deduction received by the donor.[299] We aren't aware of any international examples where fee for service is required through government policy.

Depending on the level the fee is set at, and in the absence of legal requirements to respect the food recovery hierarchy and tax conditions that facilitate donation, fee for service might drive potential donors further down the food recovery hierarchy to cheaper waste management options. With the landfill levy going up[4] and MfE considering a ban on sending organics to landfill by 2030,[214] a fee for service may increase in viability with these developments and a pilot scheme could be useful to test this.

Fee for service isn't the only option for increasing surplus food donor's financial support for food rescue organisations. For example, at present, instead of a fee for service, some donors in Aotearoa voluntarily support rescue organisations in covering some of their costs in other ways (e.g. Countdown's contestable fund for rescue organisations, see case study 15).[300] In Australia, major retailers Coles and Woolworths run donation appeals to raise funds for their food rescue partners.[301,302]

Credit arrangements and supply relationships may need to be addressed in the retail context

Food retailers sometimes access stock from suppliers via credit arrangements, where they pay suppliers after stock is sold, and return unsold stock to suppliers. Credit stock arrangements may create two challenges associated with retail donations, but more research is needed to understand the extent to which these issues manifest in the New Zealand context.

Firstly, some retailers may want to donate unsold credit stock rather than return it to the supplier (who may donate it or dispose of it some other way). Allowing retailers to donate unsold credit stock directly to the rescue sector could potentially boost the volume of food donated to rescue organisations in a timely manner.

However, this may introduce a second challenge. With the Commerce Commission's enquiry into supermarkets in Aotearoa finding that suppliers are often expected to meet at least part of the cost of stock shrinkage and wastage,[303] there is a risk that supermarket donations of credit stock may occur at the suppliers expense. Monbiot (2022) suggests that this practice occurs in the UK, with supermarkets able to overorder so that they can make larger donations to the rescue sector, boosting their image at the expense of their suppliers.[304]

5.2 Infrastructure and resources are necessary

The infrastructure and resource needs of rescue organisations depend on their scale and the types and volumes of donations they handle, but can include vehicles for food collection and distribution (including refrigerated vehicles), scales to weigh food and measure impact, office space and equipment, warehouse space, fridges and freezers, and forklifts.[52,144] Procuring and maintaining the needed resources requires sustainable funding, one of the rescue sector's greatest challenges.[62,135,154] Human resources are also crucial to the rescue sector's operation, particularly volunteers (see section 5.3), and having people available to collect food on the weekends plays a significant role in capturing the maximum possible surplus food at risk of going to waste.[305]

If the sector isn't resourced to provide regular and reliable food collections and if other surplus management strategies are cheaper and easier, prospective donors may opt to use other surplus management strategies lower in the food recovery hierarchy, such as diversion to animal feed.[62,204]

In addition, prior investment in food rescue capacity can enable organisations to act quickly to prevent food waste in the face of exogenous shocks. For example, when Countdown Henderson faced a fire in 2021, Fair Food organised an emergency rescue of 30 pallets of frozen and chilled food and a further 19 pallets of dairy products, along with 16,500 eggs.[203] The single incident led to the rescue of over 19 tonnes of food, enabled by Fair Food's response capacity and the existing relationship with Countdown (see section 5.5).

Figure 27: A Kiwiharvest refrigerated truck.

Prior to the central government support mobilised by COVID-19 (see section 2.2), funding was primarily attained through private sector donations and grants and support from local government, as well as occasional dispersions from MfE's Waste Minimisation Fund and the Energy Efficiency and Conservation Authority's electric vehicle fund.[62] With the majority of the central government support provided to the sector over the last few years being short-term, discretionary, or ambiguous, the rescue sector is currently operating in an uncertain environment, which makes it difficult for them to plan expenditure strategically (see section 2.2).

Some food rescue organisations are concerned that a lack of forward funding certainty could decrease existing capacity and the ability to continue rescuing food at current volumes. AFRA surveyed its members in 2021 (see figure 28), with 60% of respondents reporting that a lack of funding would lead to a reduction in paid staff and 50% reporting an expected reduction in services or capacity.[154]

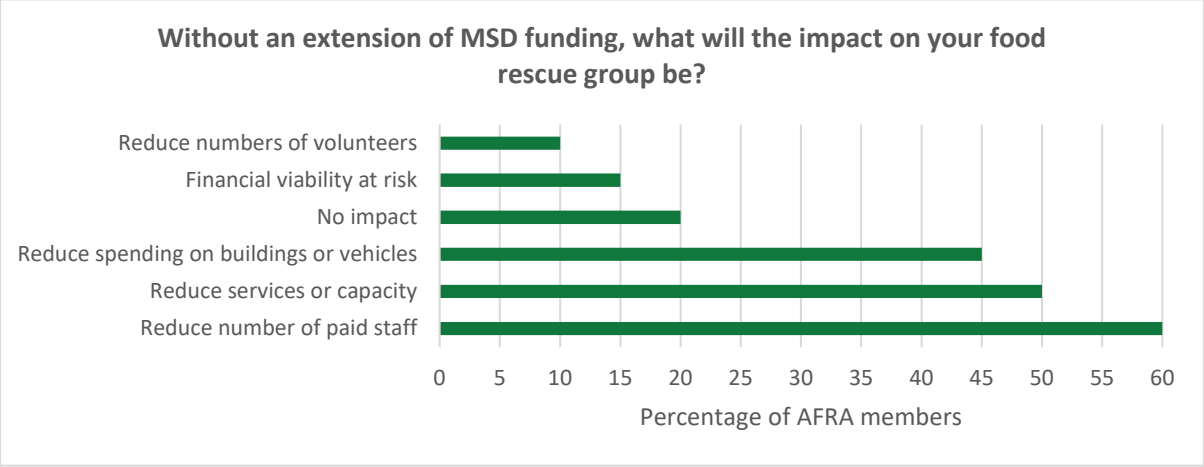

Figure 28: Responses to AFRA survey, which was conducted among AFRA's 23 members in 2021. Abbreviations: AFRA = Aotearoa Food Rescue Alliance, MSD = Ministry of Social Development. Data provided by: AFRA.[154]

5.3 Volunteers are crucial

Approximately 4,000 people volunteered with AFRA members in the past year.[154] Without sufficient volunteers, the food rescue sector could not function,[306] with volunteers contributing more hours to the operation of rescue organisations than paid staff.[190,307] COVID-19 highlighted this, with lockdowns creating uncertainty around staffing levels, which was particularly challenging to manage given the sector's reliance on volunteers.[135,138]

Volunteers tend to be motivated by one or both of the rescue sector's areas of impact – the environmental or the social.[1] A Canadian study found that alleviating hunger was the main motive, with the environmental aspects being secondary, but we aren't aware of any New Zealand-based studies looking at the split of volunteer motivations here. In Aotearoa, many volunteers frame the issue with a justice lens, acknowledging that wasting quality food is simply not right when there are hungry people without enough food.[308] Others point out that a focus on the environment may destigmatise rescued food. Volunteers cite a desire to provide practical help, and want to contribute to action on issues they see within their community.[1]

The use of rescue organisations to distribute government-procured food as part of the COVID-19 response was described by some stakeholders as potentially off-putting for volunteers who were primarily engaged with the sector for its environmental impact, a tension that needs to be navigated with care given the crucial importance of maintaining a strong volunteer base.

Figure 29 (left to right): Volunteers from Deloitte preparing food for cooking; Volunteers from KPMG. Image credit: Fair Food.

Volunteers also have other motivating factors including personal and professional development and the expansion of their social circles.[309,310] While motivations and drivers for volunteers are broad, feeling appreciated and a valuable part of the team are important for their continued support and work with a food rescue organisation.[310] Volunteers come from a variety of backgrounds. Fair Food in West Auckland has developed volunteering opportunities for schools and corporations, and ensures volunteering opportunities are available for people of all abilities, as well as incorporating educational and development elements to the volunteering experience.[203,305] Former and current recipients of rescued food may volunteer with the sector too.[311]

Volunteers often construct meaning and purpose from the diverse tasks associated with working in the rescue sector, including sorting and packing food, and preparing and serving meals.[308] Volunteers can act as gatekeepers and their individual perspectives shape what is donated to recipients and what is treated as waste.[308] They also play a crucial role in ensuring the food rescue sector operates safely[204] (see section 4.4). Volunteers may also engage in administrative, marketing, or research

tasks. For example, Farro Fresh's marketing team collaborated with Fair Food on a digital cookbook photographed at the Hub after spending an afternoon volunteering in the kitchen.[203]

5.4 Donor training and staff buy-in are critical factors for success

Food rescue can be enhanced when staff at prospective donor businesses are trained in food rescue and have an appreciation of the food recovery hierarchy.[5] In addition, staff on the frontline may be enabled or constrained by the direction set by the business,[43] which can promote food rescue by communicating its value to staff, providing guidelines to enable them to enact rescue practices, and ensuring rescue activities are prioritised and resourced.

> … staff were motivated by concern for the environment, care for the community, a desire to increase profits, and a drive to 'do the right thing.'

A 2018 study looking at food waste in the retail space found that staff were motivated by concern for the environment, care for the community, a desire to increase profits, and a drive to 'do the right thing'[5] (see case studies 15, 16, and 17 for retail donor case studies). The same study cited staff training and education as a barrier to combatting retail food waste in practice and noted a need for staff to be engaged in ongoing training and believe in the mission. While clear written guidelines about what is suitable for donation are helpful, active training is crucial to supporting the consistent implementation of guidelines. In addition, guidelines need to be informed by an understanding of what the rescue sector can handle logistically and what is safe to donate.[312] Inconsistencies currently exist – for example, aspects of the donation guidelines produced by AFRA,[144] Countdown,[300,313] and Foodstuffs[314] conflict with one another (see annex 2).

Figure 30: Produce donated to a rescue organisation from Countdown.

The importance of moving beyond guidelines to active staff training and buy-in to the food rescue kaupapa is highlighted by retail and rescue stakeholders. KiwiHarvest and Countdown are currently working towards incorporating food rescue training into the induction programme for all new Countdown employees, and also hope to establish a food waste champion at each store, who can support the rescue work.[315] Consistent training between retail stores would be valuable given staff mobility between stores.

Engagement with food rescue can also serve as an opening for broader conversations and action on food waste in donor organisations, by helping to make visible the surplus food that is wasted, potentially inspiring actions to combat food waste that go beyond food rescue.[211]

Case study 15: Countdown

Countdown has a zero food waste to landfill target, as part of its wider 2025 sustainability plan.[282] Countdown has a policy in place that surplus food, wherever possible, is donated to the food rescue sector, with every store having at least one food rescue partner. Enabled by Countdown's centralised ownership model, every store engages in food rescue,[62] and work is underway to standardise donation practices across stores. In the past year Countdown reported that the amount of food donated equated to around $5.2 million in retail value.[300] Beyond this, Countdown also has a contestable fund that its rescue partners can apply to, from which more than $742,000 has been dispersed in the last four years.[300]

Figure 31: A Kiwiharvest collection point for donated goods at a Countdown store.

Countdown has developed in-store instructions to help staff support food rescue practices, and a set of guidelines outlining what can be donated, ensuring that it is quality and can be used by recipients.[300] The guidelines specify when different food categories can be donated and processes for donation including allocating collection points. Training, resourcing, and staff buy-in remain crucial to the operationalisation of the guidelines. In addition, Countdown is trialling a digital tool to help staff work out what can be donated (see section 5.6).

Case study 16: Foodstuffs

92% of Foodstuffs sites (Pak'nSave, New World, Gilmours, Raeward Fresh, distribution centres, and corporate sites) are on the Waste Minimisation programme at Foodstuffs. The focus of the programme is to increase the national landfill diversion rate from 75% to 81% by 2025, with the intention to expand the program over the next few years.[316]

Food waste is a one of six waste streams managed as part of the programme. In the 2022 financial year, Foodstuffs donated more than 2,000 tonnes of surplus food through food rescue partners throughout Aotearoa.[316] Foodstuffs have also introduced best practice guidelines for food donation.[314]

Figure 32: Pak'nSave Albany and KiwiHarvest workers in conversation. Image credit: Foodstuffs.

All stores are encouraged to work with food rescue organisations in their area but being a co-operative business, practices vary from store to store.[317] One example of a store committed to food rescue is Pak'nSave Albany.[316] Before the best practice guidelines were launched, the store worked mostly with a single food rescue partner who took non-perishable items and would compost or landfill what their food rescue partner could not take. Since the launch of the guidelines, they have established a robust partnership with a second food rescue who enables them to donate from their produce and chilled departments and have been working on putting processes in place to

donate frozen and butchery food items. These measures have seen the store increase total donations to close to five tonnes each month.

Foodstuffs NZ is currently reviewing food rescue practices across its stores and is encouraging each store to donate all their surplus food.[316,317] While most Foodstuffs supermarkets and distribution centres have existing partnerships with food rescue organisations, the business is looking into further opportunities to optimise these relationships, especially for smaller stores. However, the location of the store or the small volume of surplus food is sometimes a barrier to collection.

Foodstuffs says the success of the partnerships, in terms of the volume and range donated, is the result of several factors including: reliability of the collections; the food rescue organisations capability to accept both non-perishable and perishable food items; processes to ensure food is separated out by each department; and having staff available to manage contact with the food rescue organisation.[316] Foodstuffs' guidelines stress the importance of addressing food waste, highlight that store owners are protected through the Good Samaritan clause when they donate safe and suitable food (see section 4), and outline the foods that can and can't be donated.[314]

Case study 17: Farro Fresh

Farro Fresh is a NZ-owned and operated group of six food stores in Auckland. They've had a food rescue partnership with Fair Food for the past 11 years and provided them with over 100 tonnes of fresh food for the community last year. Sustainability is a critical part of their overall business model. Less than 1% of their food waste goes to landfill. Over 80% of stores' food waste gets turned into stock feed, 10% is composted, and 5-8% goes to Fair Food.

Store managers and employees are well-resourced to prioritise setting aside edible fresh foods that are not fit to sell. Farro Fresh also partners with Fair Food on fundraising opportunities in stores, including Fair Food-branded merchandise and a round up donation option for customers. Their focus on seasonal and local food extends to recipe ideas generated in partnership with Fair Food.[203]

Figure 33: Farro Fresh staff sorting produce at Fair Food. Image credit: Fair Food.

5.5 Strong relationships between donors and rescue organisations help

While some donors are in the process of streamlining and improving their food rescue practices, others are yet to connect with the rescue sector, or otherwise represent a gap in our knowledge – particularly food service businesses and small retailers. As the profile of the rescue sector increases, including through AFRA's work in developing guidance and resources to support donor onboarding,[144,312,318] and the social and environmental importance of diverting surplus food to people is increasingly socialised, more rescue relationships will likely be forged in the months ahead. Knowledge of how to find and cooperate with a partner will be an important determinant of this progress.

In France, a law was introduced in 2016 requiring all large grocery stores to sign contracts with food rescue non-profits and imposes penalties for non-compliance.[319] The edible food recovery law was expanded in 2019, to include food manufacturing industries and restaurants. There is debate around whether this punitive approach to promoting engagement with the rescue sector is a workable model in other contexts,[320] and in light of the role of donor buy-in to facilitating optimised food rescue (see section 5.4). In addition, food rescue organisations in France expressed concern that they may not be able to handle the anticipated increase in food donations. When California introduced a similar requirement to bolster the donation of surplus food, which took effect this year,[321] it sought to draw lessons from the French experience. In addition to requiring surplus food donations, California introduced policies intended to ensure rescue organisations are appropriately resourced to handle increased donation flows and minimum requirements relating to the quality of donated goods are upheld[322] (see annex 2).

An alternative approach to legal mechanisms requiring donation is being trialled by Environment Network Manawatū. Environment Network Manawatū is launching a voluntary food rescue declaration that food businesses will be invited to sign onto, committing them to considering the food recovery hierarchy when working out how to manage surplus food.[323] This means that they will be asked to prioritise redistribution of any surplus food to people first and foremost, followed by animal feed or composting if the food isn't suitable for human consumption, with landfilling as a last resort.

In addition to requiring surplus food donations, California introduced policies intended to ensure rescue organisations are appropriately resourced to handle increased donation flows and minimum requirements relating to the quality of donated goods are upheld.

Every food rescue organisation's needs and resources are different – for example, they vary in their cold storage capacity, frequency of pickups, number of volunteers, volumes of food that can be handled, and recipient communities. Similarly, prospective donors have vastly different contexts, dependent not least on where they sit in the food supply chain. Clear communication, strong relationships, and investment of time are all important factors in ensuring the smooth operation of rescue relationships. AFRA suggests that donors and rescue organisations sign Memoranda of Understanding when they form partnerships to clarify expectations, helping lay the groundwork for a productive relationship.[312]

In addition, efforts up front to find a rescue partner that can handle the frequency, volume, and types of food donated is crucial. In the UK, the Sustainable Restaurant Association produced a helpful guide for food service businesses to support them in finding a suitable rescue partner (see figure 34),[324] a resource which could be adapted for the New Zealand context and for food businesses throughout the food supply chain.

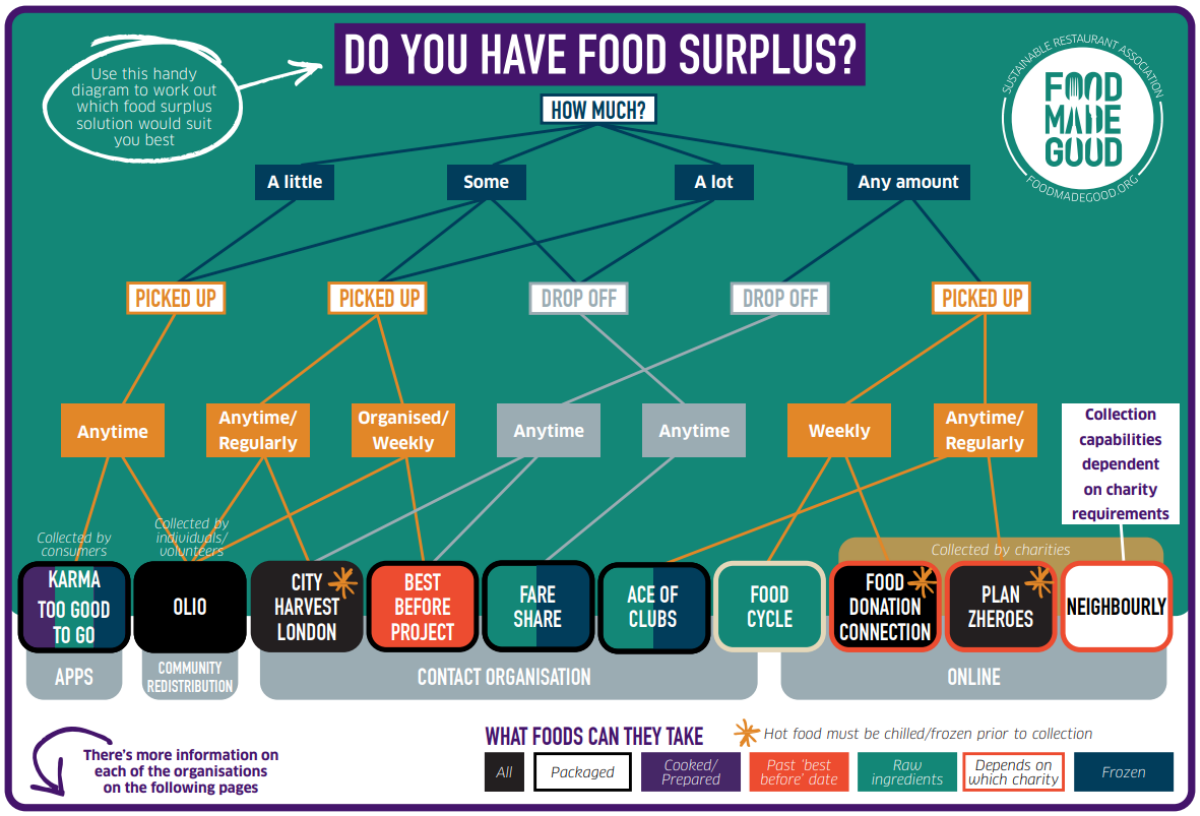

Figure 34: Decision tree included in the UK Sustainable Restaurant Association's resource for the food service sector,[324] designed to help businesses find a suitable rescue partner depending on the volume and type of food they have to donate and the collection arrangements and frequency that would work for them. Image credit: UK Sustainable Restaurant Association.

5.6 Technology can support rescue sector operations

Technological aids can support the smooth operation of the rescue sector, including by helping donors to identify food that is suitable for donation and in facilitating connections between rescue organisations and donors.

For example, Countdown has trialled an enhancement to their technology that helps keep track of stock, which will be rolled out nationwide across all stores in Aotearoa. Staff scan unsold stock and are guided through a food recovery hierarchy decision tree to determine how to manage surplus food items. If the food is safe and suitable for human consumption, the tool will prompt the staff member to set it aside for food rescue. If not, it will guide them to suitable diversion options lower in the food recovery hierarchy, such as setting it aside for collection by a local farmer. The technological enabler also helps with measuring supermarket food waste and accounting for how it is managed, and the data gathered can be used to alert farmers and rescue organisations in real time that there are pickups available.[37]

NZFN also uses technological enablers to smooth the donation process. They have an online registration system for food donors as well as for the community hubs that they distribute to, which helps them to equitably manage and allocate requests for surplus food.[52,206]

Technological aids can support the smooth operation of the rescue sector, including by helping donors to identify food that is suitable for donation and in facilitating connections between rescue organisations and donors.

Some food rescue initiatives, predominantly in overseas contexts, use apps or other technological platforms to matchmake between donors and recipients, the so-called virtual food banking or digital redistribution model.[170] Under this model, the rescue organisation operates with minimal infrastructure, either collecting surplus food and distributing it directly into the community without storage or processing in between, or by providing a digital platform that allows donors and recipients or recipient charities to connect directly to facilitate the food exchange themselves (e.g. FoodCloud).[325] In the US, Food Rescue Hero is a technology platform and mobile app that alerts volunteer drivers to when surplus food near them is available to be picked up for redistribution to charities.[326] Apps including Y Waste, Olio, and Foodprint are examples of technology-enabled rescue models in the New Zealand context, with all three operating on small scales by connecting individual consumers to surplus food, which can be collected either for free or at a discounted price.[62,171] Adaptive pricing, a food waste prevention strategy, will be explored further in future reports in the series.

5.7 Cooking and processing could help to capture more food

When rescued food is distributed to recipients 'as is,' (e.g. in a food parcel), the food has to be in better shape with more shelf life remaining than if it is made into meals, baking, preserves, smoothies, or other food products. When being added to a meal or food product as an ingredient, deteriorated or damaged parts of food can be removed, food that's inedible in its current form can be processed to a form where it is safe and suitable for consumption, and cooking can extend the amount of time for which the food remains good to eat. Further, providing cooked meals can help recipient communities by reducing the time and costs associated with meal preparation. There's also a social and educational benefit associated with this work for the volunteers.

In addition, processing fresh produce can help to extend the shelf life of fresh products. With surplus produce sometimes arriving at rescue organisations in large volumes and with little forewarning – the so-called 'surprise chain.'[177] For example, a seasonal glut can mean that rescue organisations find themselves with large volumes of perishable goods on their hands that are difficult to redistribute in a timely manner.[15,52,327] Processing perishable food to shelf-stable products, e.g. tomatoes to tomato paste, can help manage these gluts, reducing waste and also evening out food flows to recipient communities.[151] However, processing donated food requires additional infrastructure, skills, time, and comes at a cost. There are also packaging considerations associated with providing meals for recipients to take home.

Figure 35: Rescued food cooked into a community meal.

Cooking and processing food isn't a significant feature of food rescue in Aotearoa but is practiced in some rescue models, particularly mixed-model rescue organisations (see section 2.4)[182] as well as Rescued Kitchen (see case study 18). In Australia, FareShare is a major food rescue organisation which exclusively distributes cooked meals (see case study 19). Several rescue organisations in Aotearoa are interested in including more cooking and processing into their work. For example, Fair Food in West Auckland has recently installed a kitchen for this purpose.[9,305] When expanding

into this space, additional food safety considerations apply beyond those that apply to rescue organisations that primarily redistribute unmodified food (see section 4 and annex 2). Upcycling will be further considered in later reports.

Case study 18: Rescued Kitchen and Countdown

Countdown has partnered with Rescued Kitchen to upcycle surplus food into a new range of premium ingredients and products.[328] To date Rescued Kitchen has processed over three tonnes of surplus food from Countdown, and the list of surplus food Rescued Kitchen is able to capture continues to grow. Four baking mixes and two breadcrumb products are being launched in four Auckland stores and online this year. Rescued Kitchen also does catering, and is a preferred supplier in the Countdown support office.[329]

Rescued takes surplus Countdown instore bakery bread and processes it, with no additional additives or preservatives, into 'rescued bread flour' giving it a shelf life of two years. The bread flour has been developed into baking mixes; vanilla, chocolate, lemon + gin botanicals, and savoury. The baking mixes give customers the opportunity to add their own surplus fruit or vegetables to the mix. The lemon + gin botanicals baking mix also includes lemons rescued from Countdown and gin botanicals from Good George. One of the rescued breadcrumb products also contains rescued herbs.

Over 400 kg of lemons destined for landfill were processed with zero waste into lemon powder, a premium ingredient with a shelf life of two years. Rescued will also rescue from Countdown suppliers including George Weston Foods, where returned bread from Countdown is processed by Rescued into rescued bread flour.

Case study 19: FareShare Australia

FareShare is a charity kitchen operating in Melbourne and Brisbane that uses food rescued from farmers, supermarkets and other businesses (plus donated food and, in Melbourne, food grown in three kitchen gardens) to produce nutritious, free meals.[330] The meals are distributed in ready-to-eat portions to frontline charities working with people who can't afford or cook their own meals. All cooking is overseen by experienced chefs and takes place in commercial kitchens, with support from about 1,500 volunteers. Funds to cover FareShare's operational costs come from donations and government grants.[330,331] FareShare's 2020/21 annual report documents the scale of the organisation's impact: nearly three million meals were cooked and nearly 900 tonnes of food rescued.[332]

Annex 1: Food rescue emissions studies – life cycle lens

The methods and results of academic studies exploring the emissions impact of food rescue organisations are summarised below, as well as the methodologies underpinning the approach used by AFRA and Satisfy Food Rescue in Aotearoa. Note that a life cycle lens isn't universally accepted as a valid approach to assessing the rescue sector's climate impacts – some argue that only the reduction in end-of-life emissions should be counted. In subsequent reports in the series, we will look at the emissions impacts of a wider range of food waste management options (e.g. composting, anaerobic digestion, landfilling).

Table 1: Summary of studies looking at the emissions impacts of food rescue, through a life cycle lens. The academic studies are sorted in reverse chronological order, with the AFRA and Satisfy Food Rescue figures included at the end. Abbreviations: AD = Anaerobic Digestion AFRA = Aotearoa Food Rescue Alliance; CO_2e = carbon dioxide equivalent; MRIO = multi-region input-output.

Study	**kg CO_2e saved per kg food rescued**	**Methodology and key assumptions**	**Additional comments**
Sundin et al. (2022)[218] – Sweden	Surplus food basket based on rescued food composition: 0.40 kg CO_2e/kg	This study accounted for emissions associated with rescuing food (incl. transport, packaging, electricity, and residual waste treated via AD and incineration) and assumed that rescued food replaced dietary intakes established through dietary recall studies with rescued food recipients. This study also sought to quantify emissions from the 'rebound' effect – i.e. the emissions impact of purchases made by food recue recipients with the money saved through access to rescued food.	The study compared the emissions impact of food rescue with the emissions impact of AD and found that rescue has almost twice the climate benefit of AD.
Damiani et al. (2021)[219] – Italy	Surplus food basket based on rescued food composition: 1.9 kg CO_2e/kg	This study accounted for emissions associated with rescuing food (incl. refrigeration, electricity, transport, and residual waste treatment via incineration, AD and composting – with no allowance for residual waste emissions) and assumed that rescued food replaced an equal quantity of the same food.	This study assessed the environmental impacts of rescuing surplus food compared to managing it through a combination of incineration, AD and composting. Rescuing food was on average beneficial across 17 of the 18 environmental impact categories studied – the only category for which the impact of rescue was worse than the waste management scenario was urban land occupation. Rescuing animal-based food products had the greatest positive environmental impact given the greater impact of producing these products relative to plant-based foods.

Study	kg CO_2e saved per kg food rescued	Methodology and key assumptions	Additional comments
Albizzati et al. (2019)[215] – France	No overall figure provided	The only rescue-related emissions accounted for in this study were transport emissions. It was assumed that rescued food replaced cheap alternative food products of the same category as the rescued food.	This study compared current practices for surplus management by French retailers (predominantly food rescue and diversion to animal feed) with three alternate scenarios: prevention of all surplus, AD, or incineration. The authors found that "redistribution leads to substantial environmental savings when accounting for all potentially induced benefits, second only to prevention." AD and incineration were not environmentally competitive management strategies. From a climate perspective, prevention and rescue were found to have the potential to prevent 0.4 to 3.9 tonnes of CO_2e per tonne of food waste prevented or rescued, compared to 0.065 to 0.2 tonnes of CO_2e per tonne of food waste managed via AD or incineration.
Eriksson and Spångberg (2017)[217] – Sweden	Banana: 0.59 kg CO_2e/kg Tomato: 0.53 kg CO_2e/kg Apple: 0.50 kg CO_2e/kg Orange: 0.55 kg CO_2e/kg Pepper: 0.69 kg CO_2e/kg	This study accounted for emissions associated with rescuing food (incl. transport and residual waste treated via AD – with no allowance for refrigeration emissions) and assumed that rescued food replaced other fruit and vegetables (30%), potato crisps (30%) and nothing (30%), and the remaining 10% was assumed to be wasted before reaching the recipient.	The study compared the emissions impact of incineration, AD, food rescue, and conversion ('upcycling') of retail surplus into new products for sale (e.g. produce to chutney). The authors found that rescue or conversion led to greater emissions savings than AD or incineration – with the most climate positive management option varying depending on the product. The carbon savings associated with rescue or conversion for all food types ranged between 0.35 and 0.98 kg CO_2e/kg food, compared with 0.04 to 0.23 kg CO_2e/kg food for AD or incineration.
Eriksson et al. (2015)[216] – Sweden	Banana: 0.12 kg CO_2e/kg Chicken: 0.35 kg CO_2e/kg Lettuce: 0.013 kg CO_2e/kg Beef: 0.31 kg CO_2e/kg Bread: 0.61 kg CO_2e/kg	This study accounted for emissions associated with rescuing food (incl. refrigeration, transport, and residual waste treated via composting) and assumed that rescued food negated the need to produce the caloric equivalent in bread. A sensitivity analysis revealed that the latter assumption (i.e. what the rescued food replaces) was highly significant to the emissions impact calculated. E.g. if the assumption is changed for beef, rescuing beef produces 0.053 kg CO_2e if it is assumed the recipients would have eaten nothing had they not received the rescued beef, while if rescued beef is assumed to replace beef, then rescuing beef averts 26 kg CO_2e/kg (see figure 20).	The study compared the emissions impact of landfilling without methane capture, incineration, composting, AD, diversion to animal feed, and rescue. They found that, for all food products, landfilling had the greatest carbon footprint, and the carbon footprint of food rescue was always negative but, depending on the product, not always superior to other waste management options.

Study	kg CO_2e saved per kg food rescued	Methodology and key assumptions	Additional comments
Figure used by AFRA, derived from WasteMINZ estimate[156,333] – UK, modified for NZ context	Surplus food basket: 2.65 kg CO_2e/kg	This value is derived from a life cycle assessment approach that was developed by WasteMINZ using UK data on the emissions associated with food production, modified for the NZ context. This figure attempts to arrive at an average emissions figure regardless of the food type rescued, and using this figure to communicate the emissions impact of food rescue assumes rescued food displaces the need to produce equivalent food anew. It does not account for the emissions associated with the process of collecting, storing, and distributing rescued food.	Many food rescue organisations in Aotearoa use this figure to report their emissions impacts. The degree to which the positive emissions impact of food rescue is offset by collection, storage, and distribution of rescued food will depend on the extent to which emissions associated with rescuing food can be minimised, e.g. by using renewable energy sources in the rescue sector, focusing on place-based rescue solutions, etc.
Figures calculated by University of Canterbury student consulting Club, 180 Degrees Consulting, in 2016 Used by Satisfy Food Rescue[176,224]	Fresh produce: 16.03 kg CO_2e/kg Meat: 22.61 kg CO_2e/kg Bakery and bread: 3.68 kg CO_2e/kg Dairy: 3.53 kg CO_2e/kg Produce and cereal: 10.42 kg CO_2e/kg Other: 4.91 kg CO_2e/kg	These values were calculated by consulting company 180 Degrees, using food production emissions values from the international Eora MRIO database, excluding consumption and end-of-life emissions. Using these figures to communicate the emissions impact of food rescue assumes rescued food displaces the need to produce equivalent food anew. It does not account for the emissions associated with the process of collecting, storing, and distributing rescued food.	This figure was developed for Satisfy Food Rescue. Based on this model and the quantities and types of food they rescued in 2021, they found calculated that they averted approx. 8 kg CO_2e/kg food rescued.

Annex 2: Who can donate what?

The below table explores current practices, legal liability of donors, guidance, and considerations (including food safety considerations) associated with the donation of certain categories of food. While the table is not exhaustive, it seeks to cover some of the most common donation scenarios and areas where there may be confusion or ambiguity around the liability or safety situation.

Table 2: What we know about the donation of certain food categories to the rescue sector in NZ. The table is sorted by stage in food supply chain, starting with production. The key sources used in the table are the AFRA *Food Safety Guide*,[144] the *Food Act 2014*[232] the *Animal Products Act 1999*[238] (and related guidance documents), Countdown[300] and Foodstuffs'[314] internal food rescue guides, and MPI's food poisoning information sheet,[261] as well as insights derived from our stakeholder engagements (see reference group list). Donations of food directly into community pantries and fridges are not subject to any gatekeeping, so the below table does not apply – anything could theoretically be donated or accepted, and nobody is liable for any food safety consequences. NB: The AFRA *Food Safety Guide* is updated periodically (it is currently undergoing a revision). Abbreviations: AFRA = Aotearoa Food Rescue Alliance; FBANZ = Food Bank Aotearoa New Zealand.

Donor	**Food category**	**Willingness to donate?**	**Willingness to accept?**	**Liability cover for donors?**	**Guidance**	**Safety considerations**	**Other considerations**
Growers	Surplus produce	Yes	Yes	Yes – Good Samaritan clause of the *Food Act* applies	Not specifically mentioned in AFRA guide	Large volumes can be difficult for rescue sector to store and distribute before spoilage	Gleaning can support rescue of unharvested surplus Converting to shelf-stable products would help manage gluts Upcycling will be covered in detail in subsequent reports

Donor	Food category	Willingness to donate?	Willingness to accept?	Liability cover for donors?	Guidance	Safety considerations	Other considerations
Farmers	Surplus meat, dairy, eggs	Yes	Mixed practices – the AFRA food safety guide notes that "many food rescue organisations avoid all raw chicken, seafood and shell-fish"	No explicit liability protection – operate under the *Animal Products Act*, which lacks a Good Samaritan clause	AFRA guide lists meat, dairy products and eggs as 'high risk foods' Members are advised not to accept fresh chicken	Microbiological risks are elevated for animal products Chicken is a particularly common cause of food poisoning, with *Campylobacter* spp. and *Salmonella* spp. infections being of particular concern, and thorough cooking being an important risk mitigant Sensory checks for dair products and eggs (e.g. sniff test, egg float test) can help to mitigate food safety risks for these products, and could be incorporated into volunteer food safety training or guidance provided to food recipients	Freezing meat can help rescue organisations handle it safely If frozen, labels specifying the date of freezing and providing instructions for thawing and use can promote safety and reduce confusion for recipients if food is frozen before its use-by date (e.g. as per FBANZ's freezer labels)

Donor	Food category	Willingness to donate?	Willingness to accept?	Liability cover for donors?	Guidance	Safety considerations	Other considerations
Commercial fishers and aquaculture operators	Surplus seafood and by-catch	Yes	Mixed practices – the AFRA food safety guide notes that "many food rescue organisations avoid all raw chicken, seafood and shell-fish"	No explicit liability protection – operate under the *Animal Products Act*, which lacks a Good Samaritan clause	AFRA guide lists seafood as a 'high risk' food	As well as microbiological food safety risks, algal toxins are a concern particularly associated with shellfish and some fish	As with meat, freezing fish and including supporting labelling can help with safe handling and distribution Fisheries NZ is proposing to introduce a new landings and discards framework, which may lead to more landed by-catch
Commercial hunters	Game	Yes	Yes	No explicit liability protection – operate under the *Animal Products Act*, which lacks a Good Samaritan clause	Not specifically mentioned in AFRA guide	The health of the animal when killed, how it is transported, processed and stored have bearing on microbiological risk, as well as downstream handling and preparation In addition, if hunting occurs on land where toxins are used to control and manage wild animals, the type of toxins and proximity to the hunting site need to be considered	Cost of carcass recovery and processing can be significant, esp. in rugged terrain Expanded wild animal management and control operations will increase size of this rescue opportunity in coming years Recipients may be unfamiliar with cooking and eating game, so recipe ideas and cooking instructions can support successful and safe use by recipients

Donor	Food category	Willingness to donate?	Willingness to accept?	Liability cover for donors?	Guidance	Safety considerations	Other considerations
Processors, manufacturers	Food that is considered unsuitable for market (e.g. mislabelled, missing ingredient), including withdrawn products	Yes – although commercial sensitivities may reduce willingness in some cases	Yes	Yes, if operating under the *Food Act* – Good Samaritan clause applies, provided necessary corrective information is provided to rescue organisation No explicit liability protection if operating under the *Animal Products Act*, which lacks a Good Samaritan clause	Not specifically mentioned in AFRA guide	If the mislabelling relates to marking of allergens (e.g. allergens not bolded in ingredients list) this introduces a food safety challenge for the rescue sector to manage	Additional labelling to correct or explain the mislabelling can help recipients understand the status of the food and reason for donation, and ensure donors are protected under the Good Samaritan clause
Retailers	Unpackaged food (e.g. deli and bakery items, produce)	Mixed practices – e.g. Countdown's internal guide says that items that are sold in unpackaged form can be donated, while Foodstuffs' internal guide says they can't	Yes	Yes – Good Samaritan clause of the *Food Act* applies, so long as appropriate instructions to keep food safe and suitable are supplied	Not specifically mentioned in AFRA guide	Food safety practices used by retailers to ensure the safety of unpackaged food (e.g. hygiene practices used by deli workers) must be rigorously applied to ensure the safety of unpackaged food before donation	Putting unpackaged food items into packages ahead of donation (e.g. bread into paper bags) can help with handling and safety, and enable relevant instructions and information to be included

Donor	Food category	Willingness to donate?	Willingness to accept?	Liability cover for donors?	Guidance	Safety considerations	Other considerations
Retailers	Passed use-by date	No, unless frozen before use-by date (and ideally labelled with date of freezing to avoid confusion)	No, unless frozen before use-by date	No – food passed its use-by date is considered unsafe, so the Good Samaritan clause of the *Food Act* does not apply, unless frozen before use-by date	AFRA guide explicitly advises donors and rescue organisations not to rescue food passed its use-by date, unless frozen before use-by date	Use-by dates signify the point after which food could be unsafe	Due to time delays in recued food moving from donors to recipient communities, sometimes food is donated too close to its use-by date to be safe by the time it reaches recipients
Retailers	Passed best-before date	Mixed practices – e.g. Countdown's internal guidance states that chilled products past their best-before date should not be donated while Foodstuffs' internal guide says they can	Yes	Yes – Good Samaritan clause of the *Food Act* applies, unless food is too far past best-before date and has become unsafe	AFRA guide provides clear guidelines on typical 'safe windows' beyond best-before dates, by product type	Best-before dates relate to the quality of food; after the best-before date, the product may begin to deteriorate in quality	Due to time delays in recued food moving from donors to recipient communities, sometimes food is donated with too little remaining shelf life to be safe or suitable by the time it reaches recipients Best-before dates as a barrier to reducing food waste will be covered in detail in subsequent reports

Donor	Food category	Willingness to donate?	Willingness to accept?	Liability cover for donors?	Guidance	Safety considerations	Other considerations
Retailers	Meat and seafood	Yes – but relatively rare	Mixed practices – the AFRA food safety guide notes that "many food rescue organisations avoid all raw chicken, seafood and shell-fish"	Yes – Good Samaritan clause of the *Food Act* applies	AFRA guide advises donors to freeze meat ahead of donation, and also provides instructions relating to receiving unfrozen meat products, including advising against accepting fresh chicken or shellfish	Microbiological risks are elevated for animal products Chicken is a particularly common cause of food poisoning, with *Campylobacter* spp. and *Salmonella* spp. infections being of particular concern As well as microbiological food safety risks, algal toxins are a concern particularly associated with shellfish and some fish	If frozen, extra labels specifying the date of freezing and providing instructions for thawing and use would promote safety (e.g. as per FBANZ's freezer labels)

Donor	Food category	Willingness to donate?	Willingness to accept?	Liability cover for donors?	Guidance	Safety considerations	Other considerations
Retailers	Products with significantly damaged packaging (e.g. deep dents in tins, broken seal, missing label)	Mixed practices	Mixed practices	No – products with significantly damaged packaging are unsuitable and potentially unsafe so the Good Samaritan clause of the *Food Act* doesn't apply	AFRA guide tells donors not to donate "food that may have been opened, has damaged packaging or broken seals" as well as dented cans and food that has had its original label removed	Depending on the nature of damage, food safety risks may exist – e.g. deeply indented tins may pose a food safety risk as deep dents often have holes at the edges that could allow bacteria into the can Damage may also attract pests	In some situations, determining the level of acceptable damage is subjective – e.g. deciding if a dent in a tin is deep or shallow, or identifying the different safety risks posed by damage at the seam or rim compared to other parts of the product Damaged packaging on shelf-stable products is unlikely to pose a food safety risk, but the challenge of assurance and confidence in the product's safety arises

Donor	Food category	Willingness to donate?	Willingness to accept?	Liability cover for donors?	Guidance	Safety considerations	Other considerations
Retailers	Spoiled (e.g. rotten, slimy, mouldy) or otherwise affected (e.g. 'green' potatoes)	No – although food that is unspoiled at time of donation may spoil soon after donation	No – although may separate spoiled items from unspoiled ones if a mixture of spoiled and unspoiled food is received	No – spoiled food is considered to be unsafe and unsuitable, so donors would not be protected by the Good Samaritan clause	AFRA guide tells donors not to donate "food that has clear signs of spoilage e.g., mould, slime, discoloration or rusty, dented or bulging cans"	Spoiled food carries microbiological risks, and other food defects can pose safety issues too – e.g. green potatoes may contain harmful levels of solanine However, for some foods where spoilage only affects part of the product, the spoiled part can be removed and the rest can be safely used	Due to time delays in recued food moving from donors to recipient communities, food may spoil soon after donation, so in reality rescue organisations sometimes receive spoiled or partially spoiled food If 1 item in a package is spoiled and the others are fine (e.g. 1 capsicum in a pack of 3), retailers currently can't donate the food because they aren't allowed to unpackage it before donation

Donor	Food category	Willingness to donate?	Willingness to accept?	Liability cover for donors?	Guidance	Safety considerations	Other considerations
Retailers	Recalled products[h]	Potentially trade-level recalls	Potentially trade-level recalls	Potentially trade-level recalls	AFRA guide tells donors not to donate food that is subject to a current recall notice	Not all recalled products are inherently unsafe – they may have been recalled for suitability reasons, or could be made safe with corrective labelling However, any products returned from customers must be considered potentially unsafe as the retailer can't vouch for the safety of that product	The impact of allowing recalled products to be donated on the dignity of recipients would need to be considered if this inconsistency was to be addressed

[h] Recalls can be issued for safety reasons or reasons relating to a product's suitability for sale (e.g. labelling error). Separate from recalls, withdrawals can be issued, where the food is neither unsafe or unsuitable, but some other error has occurred such that the food business doesn't want its product to be sold (e.g. wrong coloured lid). Recalls can occur at the consumer level (where consumers will be asked to return products, and the product will be removed from other stages of the supply chain) or trade level (where products will be removed from the supply chain).

Donor	Food category	Willingness to donate?	Willingness to accept?	Liability cover for donors?	Guidance	Safety considerations	Other considerations
Caterers (and catering customer)	Pre-consumer surplus	Yes	Mixed practices	If the caterer maintains control of the food and donates it, they would be covered by the Good Samaritan clause of the *Food Act* If the catering food is handed over to the customer and they donate it, the caterer wouldn't be liable (as they have transferred the food to their end customer) There are no explicit liability protections for catering customers who donate surplus	Not specifically mentioned in AFRA guide	Before catering food is served, the catering company (or catering customer) is able to closely control the handling and storage of that food Catering companies are regulated food businesses and therefore likely have stronger food safety training, awareness and management than catering customers	Occasional catering customers may not have the expertise or connections required to get food to rescue organisations in a safe and timely manner In addition, catering foods are 'ready to eat' so may generally be shorter-lived than rescued food from other sources

Donor	Food category	Willingness to donate?	Willingness to accept?	Liability cover for donors?	Guidance	Safety considerations	Other considerations
Caterers (and catering recipient organisations/venues)	Post-consumer surplus	Unknown	Unknown	If the caterer donates, the liability situation likely varies depending on how the catering is distributed, as this has bearing on the caterer's ability to vouch for the safety of the food If the catering food is handed over to the customer and they donate it, the caterer wouldn't be liable (as they have transferred the food to their end customer) There are no explicit liability protections for catering customers who donate surplus	Not specifically mentioned in AFRA guide	Considerations such as temperature control of served food, amount of time out of controlled environment, and food type all have bearing on the safety of post-consumer catering surplus	As above

Donor	Food category	Willingness to donate?	Willingness to accept?	Liability cover for donors?	Guidance	Safety considerations	Other considerations
Food service business	Surplus ingredients	Unknown	Unknown	Yes – Good Samaritan clause of the *Food Act* applies	Not specifically mentioned in AFRA guide	The food safety considerations that apply to retail donations are also applicable in the context of surplus ingredient donation from the food service sector	Package sizes in the food service industry are generally larger than what a household can easily handle and use in a timely manner Repackaging or cooking meals or baking could help manage this, but food safety aspects would need to be considered
Cafés and restaurants	Cabinet food	Yes – but not widely practiced	Yes	Yes – Good Samaritan clause of the *Food Act* applies	Not specifically mentioned in AFRA guide	Food safety practices used by retailers to ensure the safety of cabinet food must be rigorously applied to ensure its safety ahead of donation	Putting unpackaged cabinet food items into packages (e.g. wrapping sandwiches) could help with handling and safety, and enable relevant instructions and information to be included
Cafés and restaurants	Plate waste	No	No	No – plate waste is not safe or suitable, so donors would not be protected by the Good Samaritan clause of the *Food Act*	Not specifically mentioned in AFRA guide	Once food has been served, it is out of the food business's control, so they can no longer vouch for its safety	Donating plate waste does not respect the dignity of recipients

Donor	Food category	Willingness to donate?	Willingness to accept?	Liability cover for donors?	Guidance	Safety considerations	Other considerations
Private individuals	Surplus produce	Yes	Yes	Unregulated space – so no liability	Not specifically mentioned in AFRA guide	Freshly picked produce presents limited safety risks, although should ideally be washed before use to eliminate physical safety risks (e.g. dirt, stones) and possible contaminants Timely transport of produce after harvesting reduces the risk of spoilage	Gleaning can support rescue of unharvested surplus at the garden level as with the commercial grower level
Private individuals	Jams and preserves	Yes	Mixed practices	Unregulated space – so no liability	The AFRA guide advises tells people not to donate home prepared food	Improper sterilisation and sealing of jars can pose microbiological safety risks – e.g. *Clostridium botulinum* is a bacterial risk associated with certain canned or bottled foods that haven't received adequate heat treatment	Private individuals aren't subject to food safety laws, so rescue organisations considering the distribution of homemade products can't provide assurance to recipients that the food is safe Upcycling will be covered in detail in subsequent reports

Donor	Food category	Willingness to donate?	Willingness to accept?	Liability cover for donors?	Guidance	Safety considerations	Other considerations
Private individuals	Meals and baking	Yes	Mixed practices	Unregulated space – so no liability	The AFRA guide advises tells people not to donate home prepared food	Improper handling, cooking, cooling and storage practices can pose microbiological safety risks – e.g. *Clostridium perfringens* is a bacterial risk associated with meat dishes than have been cooled too slowly, while baked items like breads, scones, cupcakes, and cakes without dairy cream would be lower risk products	As above
Private individuals	Dairy, eggs	Unknown	Unknown	Dairy products and eggs donated by private individuals are not subject to regulation – so no liability	Not specifically mentioned in AFRA guide	Microbiological risks are elevated for animal products – although clean, dry, undamaged eggs are lower risk	As above
Private individuals	Homekill	Unknown	Unknown	Donated homekill is not subject to regulation (although its sale is explicitly banned in the *Animal Products Act*) – so no liability	The AFRA guide recommends not accepting homekill	As with other meat-related sections in table, in addition to the risk that the meat, because it hasn't been checked through the regulated system, may be diseased, or contain veterinary drug residues	As above

Donor	Food category	Willingness to donate?	Willingness to accept?	Liability cover for donors?	Guidance	Safety considerations	Other considerations
Private individuals – recreational hunters	Meat	Yes	Yes	Donated recreationally caught meat is not subject to regulation (although its sale is explicitly banned in the *Animal Products Act*) – so no liability	Not specifically mentioned in AFRA guide	As with other meat-related sections in table, in addition to the risk that the meat, because it has not been checked through the regulated system, may not have been handled properly, or may be diseased or contain pest control poisons	As above
Private individuals – recreational fishers	Fish	Yes	Mixed practice – e.g. many rescue organisations avoid all seafood and shellfish, from any source However, one rescue organisation, Kai Ika, specialises in redistribution of fish heads and frames from the recreational fishing community	Donated recreationally caught fish is not subject to regulation (although its sale is banned in the *Animal Products Act*) – so no liability	Not specifically mentioned in AFRA guide	As well as microbiological food safety risks, algal toxins are a concern particularly associated with shellfish and some fish	As above

Annex 3: International insights

The below table summarises government-led initiatives and policies relating to food rescue in a selection of countries, with a view to providing insights to support the exploration of policy levers in the New Zealand context. Key policy levers identified in the studied countries relate to inclusion of food rescue in national food waste strategy, liability protections, food safety, tax incentives, requirements and penalties, and grants and funding. Aotearoa is included in the table for comparison, with full details in the report body.

Table 3: Summary of government-led initiatives and policies relating to food rescue. Countries were selected either because they have similar features to Aotearoa (e.g. economically, culturally, demographically, political) and/or because research and stakeholder engagement brought them to our attention as countries whose food rescue policies may provide useful insights. The table is sorted alphabetically by country, with NZ included in the first row for ease of comparison. Abbreviations: FDA = Food and Drug Administration; FEAD = Funds for European Aid to the Most Deprived; SA = South Australia; TEFAP = The Emergency Food Assistance Program; VAT = Value-Added Tax; WRAP = Waste and Resources Action Programme.

Country	National strategy	Liability protections	Food safety	Tax incentives	Requirements and penalties	Grants and funding
NZ	No national food waste strategy or food rescue strategy. For details see report one in the OPMCSA food waste series, *Food waste: A global and local problem.*	Commercial food donors are protected from liability by section 352 of the *Food Act 2014*, as long as the donated food is not sold. See section 4.3 for details.	AFRA has produced and plans to periodically update a food safety guide for donors and rescue organisations. Food rescue organisations that provide food to recipients for free sit outside the regulated food system, but have a duty of care to provide safe and suitable food to recipients. See section 4 and annex 2 for details.	Donated goods in NZ don't attract GST, so GST is not a barrier to donation. Income tax currently doesn't apply to trading stock donations, a provision introduced in the face of COVID-19 that is in place until March 2023. See section 5.1 for details	There is no requirement for food businesses to donate surplus food, and no ban on organics to landfill, although MfE is considering a 2030 ban. The waste levy is progressively increasing from $30 per tonne of waste landfilled to $60 by mid-2024. See section 5.1 for details	Food rescue in NZ is funded through a combination of government and philanthropic sources, and donations from the public. In terms of government funding, food rescue has been funded by territorial authorities and through the Waste Minimisation Fund, and more recently through central government funding mobilised in the face of the COVID-19 pandemic. Funding has been characterised by short term contracts. See section 2.2 for details

Country	National strategy	Liability protections	Food safety	Tax incentives	Requirements and penalties	Grants and funding
Australia	*National food waste strategy: Halving Australia's food waste by 2030*, which is focussed on reducing food waste across the food system, includes food rescue.[334] Australia has established the Stop Food Waste Australia consortium to move the country towards the strategy targets.[335]	Every state in Australia has passed laws that protect food donors from civil liability, but not all states provide protection for the organisations that distribute donated food.[336]	Charities that distribute food for free aren't food businesses under Australian law so don't need to comply with chapter 3 of the *Food Standards Code*, which governs food safety in Australia.[337] However, even asking for a donation for food constitutes a sale and would mean a charity would need to comply with food safety law.[239]	Donors can claim a deduction for food donations to qualifying institutions under certain circumstances, though this deduction may not cover the cost associated with donation (transport, storage, etc).[336] Most foods in Australia don't have VAT, so VAT doesn't pose a barrier to donation.	Australia doesn't have a nationwide ban on organics or surplus food to landfill. Waste levies vary by state. For example, the waste levy in Queensland is moving from $85/tonne for general waste in a metropolitan area in 2021/22 to $145/tonne in 2027/28. [287] In Adelaide the levy rates are $149/tonne in metropolitan areas and $74.50 in other areas.[288]	Funding is available in some states. E.g. the Department of Human Services and Green Industries SA provide funding in SA,[241] and over AU$900,000 was provided in 2020 to 6 organisations in Queensland for infrastructure, equipment, and operational costs.[338]
Canada	The *National Food Policy* includes a Food Waste Reduction Challenge.[336]	All provinces in Canada have passed laws to provide donor companies, food recovery organisations, and individuals protection from civil liability for donated food.[336]	Provincial and territorial laws are designed to ensure any food collected meets food safety requirements.[339]	4 provinces provide tax credits at 25% of wholesale value to farmers who donate to foodbanks.[339] Federal tax credits also apply but are hard to access and often negated by the requirement to pay income tax on donated food.[336]	There is no legislation requiring excess food to be donated.[336] While there is no nationwide ban on surplus food or organics to landfill, the government of Nova Scotia has had a ban on all organic waste to landfill since 1998.[340] Tipping fees vary by state.[341]	During COVID-19 a surplus food rescue programme occurred. A $50 million dollar initiative which supported food rescue and distribution with funding to 8 different organisations.[100]

Country	National strategy	Liability protections	Food safety	Tax incentives	Requirements and penalties	Grants and funding
EU	Almost every country in the EU acknowledges the rescue sector as part of the solution to food waste in their national food waste strategy documents.[278]	Food donors are explicitly exempt from liability for food safety problems that occur downstream of their donation in at least 12 EU member states. A small number rely on informal guidelines or approaches to liability transfer.[278]	Of the 16 EU member states for which information was provided in an EU food donation summary document, 12 consider foodbanks to be food business, meaning they have to comply with food safety laws. [278]	Food donors don't have to pay VAT on donated goods in most EU countries. Some countries have caps on the value of donated goods up to which VAT exemptions apply (e.g. in Croatia, the value of donated food should not exceed 2% of the donor's turnover).[278]	The Landfill Directive (1999/31/EC) obliged EU member states to reduce the amount of biodegradable municipal waste sent to landfill to 35% of 1995 levels by 2016 (or 2020 for some states). In 2014, a proposal to review the Landfill Directive was adopted, proposing more ambitious targets relating to organic waste, including food waste specifically.[342] The Waste Framework Directive (2008/98/EC) embeds the waste hierarchy in European law. Landfill levies vary across the EU. A 2012 study looking at tipping fees across the EU found a negative correlation between the median landfill charge in a country and the percentage of municipal solid waste that is landfilled.[341]	FEAD supports European countries to provide food or other basic assistance to the most deprived.[204]

Country	National strategy	Liability protections	Food safety	Tax incentives	Requirements and penalties	Grants and funding
France	Food rescue is addressed to some extent under *the French National Pact Against Food Waste*, a voluntary agreement to reduce food waste nationally.[343]	Food donors and charities are recommended to have liability insurance.[343]	There are guidance documents for donation and redistribution of food, which include practical guidance for types of products that can be donated and compliance with date and labelling requirements.[343]	60% of the net book value of donated food can be claimed as a corporate tax credit and deducted from the corporate tax on their revenue.[242]	Supermarkets are forbidden to dispose of edible surplus food and are required to partner with food rescue organisations.[319] The 2016 law has since been strengthened and widened. The law establishes an anti-food waste action hierarchy (prevention, rescue, animal feed, AD or composting, disposal).	The government distributes funding from FEAD to charities such as the French Federation of Food Banks.[343]
Italy	The Ministry for Environment, Land and Sea Protection adopted a food waste prevention programme in 2013.[175]	Non-profit organisations are seen as the final consumers, shifting the liability from the retailers.[175]	The *Stability Law 2013* contains essential safety requirements for food donation.[343] There are guidelines available for donor organisations.	Waste tax due is reduced based on the certified amount of surplus food donated.[280]	Italy has a law for donation and distribution of food to limit food waste, which prioritises human consumption.[319] The law aims to reduce food waste throughout the food system.	There has been funding for research on food redistribution.[343]
Netherlands	Food redistribution measures are included in the *United against food waste* national strategy.[343]	The manufacturer remains responsible for the quality of food until the use-by or best-before date.[242]	The government supports food businesses to understand and interpret food safety regulations affecting food distribution.[343]	Companies can claim deductions of their donations to 'institutions for public benefit' (up to a capped value).[276] Enhanced deductions are available when donations are made to cultural institutions.	There are no requirements or penalties related to food redistribution.	In Amsterdam, there is a subsidy to the Amsterdam Food Bank, which subsidises rather than covers costs. FEAD funds are not used for food redistribution.[343]

Country	National strategy	Liability protections	Food safety	Tax incentives	Requirements and penalties	Grants and funding
Portugal	The *National Strategy and Action plan to combat food waste* includes food rescue.[344]	There are no clear liability protections in Portugal.[343]	There are minimum hygiene guidelines for donated food, and guidelines for transport, storing conditions, traceability, stock management, and labelling.[344]	Donors in Portugal can deduct 140% of the value of food at the time of donation as long as the food is donated for 'social purposes' and limited to 8/1000 of the donor's turnover.[242]	There are no requirements or penalties related to food redistribution.	We are not aware of grants or funding available for food redistribution.
Spain	The national circular economy strategy *Circular Spain 2030* aims to reduce the generation of food waste by 50% in the household and retail level and 20% in other stages of the food supply chain.[282] The *More Food Less Waste* national strategy on food waste has been implemented since 2013.	There are no clear liability protections provided in Spain.[343]	There is no legislation specific to food rescue. There are some regional-level guides to hygiene practices for food redistribution.[343]	35% of the net book value of donated food can be claimed as a corporate tax credit (and deducted from the corporate tax on their revenue).[242]	Current legislation in the legislative body which would require supermarkets to donate or sell food at a discount which is nearing expiry. The fines could be between €6,000 to €150,000.[85]	FEAD funds have been used to develop an operational programme for food redistribution for disadvantaged people. Food is purchased and then distributed through various charities.[343]
Norway	It is unclear whether food rescue is incorporated within the national waste management plan.	There are no liability protections.	Food for redistribution must follow food legislation. There are guidelines for the safe reuse of food.[345]	The Norwegian government has a VAT exemption on food redistributed to charities.[345]	No requirements or penalties specific to organic waste. Norway's waste management mix is dominated by recycling (including composting and other biological treatments) and incineration, with minimal landfilling. [346]	Public funding contributes to financing food redistribution.[347]

Country	National strategy	Liability protections	Food safety	Tax incentives	Requirements and penalties	Grants and funding
UK	*Our waste, our resources: A strategy for England* includes surplus food.[33]	There are no liability protections.	Any organisation providing food on a regular and organised basis is considered to be a food business under UK law and is required to register and comply with food safety rules.[241] Government has partnered with organisations such as WRAP to clarify food safety requirements.[348]	Companies in the UK can generally deduct the value of donations from their total business profits before tax.[276] When food is given to a charity for further distribution, the food has a VAT rate of 0%.	The UK doesn't have nationally uniform legislation requiring surplus food donations or banning waste to landfills given waste policy is fully devolved to regional governments.[349] Northern Ireland has a ban on food waste to landfill. England and Wales don't have bans in place, while Scotland will introduce a ban in 2025 (originally planned for 2021, and notified in 2012, the ban has been pushed back after an assessment of organics processing infrastructure revealed it was insufficient to cope with a 2021 ban).[350] Landfill taxes apply throughout the UK, set annually. Since its introduction in 1996, the standard landfill tax has been escalating and currently sits at £96.70/tonne (a separate rate applies for inert waste).[351]	There is government funding available to support surplus food redistribution, managed by WRAP.[348]

Country	National strategy	Liability protections	Food safety	Tax incentives	Requirements and penalties	Grants and funding
US	The federal-level interagency food loss and waste strategy includes strategies for enhancing food donation.[352]	The Bill Emerson Good Samaritan Food Donation Act provides civil and criminal liability protection for food donors and non-profit organisations distributing food, as long as they act without gross negligence or intentional misconduct.[244] The US was the first country to provide liability protections for food donations. All states have additional policies to supplement the federal law.	The FDA Food Code does not address food donations or apply to food charities.[353]	The US has a general and enhanced tax deduction for donated food.[279,354] The general deduction is capped at between 10-30% of total taxable income (using the base cost of food items). The enhanced deduction considers the expected profit margin of the food, rather than the base cost. Incentives were expanded in 2005, and in the following year food donations rose by 137%.	While there is no federal level requirement for donation of excess food or bans on organic waste, some states and local governments have enacted policies, requirements or targets. Organic waste bans or mandatory organic waste recycling laws are implemented in 6 states: California, Connecticut, Massachusetts, New York, Rhode Island, and Vermont.[244] In the year following the introduction of Vermont's organic waste ban, the Vermont Food Bank saw a 60% increase in food donations.[244] The average cost to landfill municipal waste in the US was US$54/tonne in 2020, but fees vary by state.[355]	There is government funding to support distribution of surplus food under TEFAP. Some states offer funding for food recovery and donation,[356] including funding for the processing of donated of game.[357]

Country	National strategy	Liability protections	Food safety	Tax incentives	Requirements and penalties	Grants and funding
California	In 2016 the Governor set methane emissions targets for the state. The state aims to reduce organic waste disposal 75% by 2025, including rescuing at least 20% of currently disposed surplus food, required under Senate Bill 1383.[321,358]	As above.	California has food safety guides for donors and food rescue organisations.[359]	As above.	Food businesses are required to arrange to donate the maximum amount of edible food that would otherwise be disposed. This requirement came into force in 2022 for retailers, distributers, and wholesalers, and will be expanded to cover food service businesses in 2024. Its applicability depends on the size of the food business.	Accompanying efforts to increase donations, the state is undertaking to ensure food rescue organisations are sufficiently resourced to handle increased donation volumes, drawing lessons from the French experience.[322,360] State funding is available for food rescue projects. US$20 million has been dispersed to 68 projects since 2018.[359]

Annex 4: Waste Minimisation Fund food rescue initiatives

Table 4: Funding allocated from the Waste Minimisation Fund to food rescue initiatives since the fund's establishment in 2010. Table provided by MfE.[130,131]

Year of funding	Project Name	Delivery Agent	Funding Approved
2014	Good Neighbour Food Rescue	Good Neighbour Aotearoa Trust	$58,000
2016	Kaivolution & Waikato Environment Centre E-Cycle Expansion	Waikato Environment Centre	$150,000
2016	Food Rescue in Northland	One Double Five Whare Awhina Community House	$150,000
2018	Strategic Expansion of Food Rescue Northland to Mid and Far North sub-regions	One Double Five Whare Awhina Community House	$350,700
2019	Establishment and ongoing operations of a food rescue service in the Kapiti and Horowhenua Districts	Kaibosh	$150,000
2020	Kai Ika Project - Development of a business case	New Zealand Sport Fishing Council	$85,000
2020	Kiwi Harvest National Expansion and Infrastructure Build	Kiwi Harvest Limited	$153,000
2020	Infrastructure and Capital Costs	0800 Hungry Ministries	$67,012
2021	Capacity Building: extending food rescue operations from 5 to 6 days and regional expansion into North West Auckland	Fair Food	$42,500
2021	Chilled & Frozen Expansion	New Zealand Food Network	$440,589
2021	Kai Conscious Waiheke	The Waiheke Resources Trust	$54,434
2021	New Kai Rescue (KR) location fit-out to enable scaling of KR capacity to receive, process & redistribute food waste to maximise waste minimisation.	Nelson Environment Centre Incorporated	$120,000
2021	Whanganui Kai Hub	Whanganui Kai Hub	$105,000

Abbreviations

AFRA	Aotearoa Food Rescue Alliance
AUT	Auckland University of Technology
CO_2	Carbon dioxide
CO_2e	CO_2 equivalent
CRC	Cooperative Research Centre
DOC	Department of Conservation
ESR	Institute of Environmental Science and Research
ETS	Emissions Trading Scheme
FAO	Food and Agricultural Organisation of the United Nations
FBANZ	FoodBank Aotearoa New Zealand (also known as Foodbank Canterbury)
FIES	Food Insecurity Experience Score
FUSIONS	Food Use for Social Innovation by Optimising Waste Prevention Strategies
GFN	Global FoodBanking Network
GST	Goods and Services Tax
HATs	Hunger Action Teams
IRD	Inland Revenue Department
MfE	Ministry for the Environment
MoE	Ministry of Education
MoH	Ministry of Health
MPI	Ministry for Primary Industries
MSD	Ministry of Social Development
NZFN	New Zealand Food Network
NZFSSRC	New Zealand Food Safety Science & Research Centre
NZHS	New Zealand Health Survey
NZU	New Zealand Units
OPMCSA	Office of the Prime Minister's Chief Science Advisor
SDG	Sustainable Development Goal
SROI	Social Return on Investment
TEFAP	The Emergency Food Assistance Program
VAT	Value-Added Tax
WRAP	Waste & Resources Action Programme
WRT	Waiheke Resources Trust
WWF	World Wildlife Fund

Glossary

Aotearoa Food Rescue Alliance (AFRA)	Launched in March 2021, AFRA is an organisation which represents 31 of New Zealand's food rescue organisations, advocating on their behalf to government and food donors, fostering collaboration between food rescue organisations, encouraging best practice, and building capacity.
Best-before date	Most packaged food in Aotearoa is required to carry a date mark. It is the manufacturer's responsibility to determine the appropriate date mark for its products and include this clearly on packaging. Best-before dates are date marks that relate to food quality. Food may still be safe to eat beyond the best-before date but may have lost some quality. Food that has passed its best-before date can be donated to the food rescue sector, but donors and recipients should assess whether the food is fit for eat.
Class 1 landfill	Municipal solid waste landfills.
Climate positive	A climate positive activity is one that goes beyond achieving net-zero emissions and contributes to removing additional greenhouse gases from the atmosphere or preventing emissions from occurring. In the context of this report, food rescue is described as being climate positive when a life cycle lens is applied, because rescued food is eaten by people, theoretically displacing the need to produce additional food and accrue the associated emissions.
Community food hub	A community food hub is a food rescue organisation that distributes rescued (and donated) food directly to community organisations, who pass the food on in food parcels and may include it in meals and baking cooked for food insecure recipients.
Community fridge	A fridge located in a public place where it can be accessed by the community. People are encouraged to 'take what you want and leave what you can.'
Community pantry	A pantry located in a public place where it can be accessed by the community. People are encouraged to 'take what you want and leave what you can.' In this report, community pantry is used to cover a wide variety of arrangements, including community fruit and vegetable stands.
Credit stock	In this context, credit stock refers to food products stocked by retailers that they receive from suppliers in advance of payment.
Donors	People or entities that donate surplus food to food rescue organisations.
End-of-life emissions	Greenhouse gas emissions that occur during the end-of-life treatment of a product. For food waste, a wide range of end-of-life options are available (e.g. landfill, composting, anaerobic digestion), all of which have different emissions profiles.
Food	In this project, food is intended to capture both food and beverages. Unless specified, we are referring to food intended for human consumption.

Food insecurity	Food insecurity was defined at the UN World Food Summit in 1996, which had 186 countries in attendance, as "the limited or uncertain availability of nutritionally adequate and safe foods or limited ability to access personally acceptable foods that meet cultural needs in a socially acceptable way."[86,361,362] Food insecurity can be separated into two categories: temporary food insecurity, which is caused by a sudden community- or personal-level shock and doesn't last more than 12 weeks, and chronic food insecurity, which is systematic and ongoing.[80]
Food recovery hierarchy	The food recovery hierarchy is a modified version of the waste management hierarchy, specific to food. There are many different versions of the food recovery hierarchy. In this project, the tiers we include are: (1) prevention, (2) rescue for human consumption, (3) upcycling to new food products, (4) animal feed, (5) material recycling, (6) nutrient recovery, (7) energy recovery, (8) disposal. Also known as the food waste hierarchy. See the first report in the OPMCSA food waste series, *Food waste: A global and local problem*, for more details.
Food rescue	The process by which surplus food is captured for human consumption, typically as part of a charity model.
Food rescue sector	In this report, the terms 'food rescue sector' and 'rescue sector' are used to describe the stakeholders involved in the operation of food rescue. This includes food rescue organisations, donors of surplus food, and downstream recipient charities that distribute rescued food.
Food safety	A condition in which food, when used as intended, is unlikely to cause or lead to illness or injury to human life or public health, as defined in the *Food Act 2014*. Safe food is free from dangerous levels of: • Microbiological hazards – Microorganisms, including bacteria, fungi, parasites, prions, and viruses, that can be present on or in food products and, if consumed, can lead to infection and illness. • Chemical hazards – A wide range of naturally occurring and manmade chemicals that can get into the food supply chain accidentally or deliberately. Common examples of chemical hazards include mycotoxins, algal toxins, and environmental contaminants. • Physical hazards – A wide range of naturally occurring and manmade materials that can cause injury if eaten. Naturally occurring physical hazards include things like stems and dirt, while manmade materials include things like plastics, glass, and needles. Food doesn't have to be free from allergens to be safe, but any allergens must be declared to avoid harming people for whom certain foods can cause an adverse immune reaction leading to illness or death, and cross-contamination or the unintended presence of allergens must be avoided.

Food security	Food security is defined as "all people at all times, having physical, social and economic access to sufficient, safe and nutritious food which meets their dietary needs and food preferences for an active and healthy lifestyle,"[267,363] a definition that comes from the 1996 UN World Food Summit. Food security is when people have sufficient nourishing food to eat and self-determination of what, how, and when they eat, and are not dependent on others for food access.[80]
Food sovereignty	A widely used definition of food sovereignty originates from the 2007 Declaration of Nyéléni, which defined food sovereignty as: "…the right of peoples to healthy and culturally appropriate food produced through ecologically sound and sustainable methods, and their right to define their own food and agriculture systems. It puts the aspirations and needs of those who produce, distribute and consume food as the heart of food systems and policies rather than the demands of markets and corporations."[364]
Food supply chain	The whole food value chain, from farm to fork. The main stages of the supply chain are: • Production (i.e. farming, growing, aquaculture, hunting, fishing, gathering, etc), including pre-harvest, harvest, and post-harvest activities. • Processing (involving one main food commodity) and manufacturing (where multiple commodities are combined to produce a composite food product). • Retail. • Consumption, including through the food service industry and in households. Handling, storage, transport, and distribution occurs throughout the food supply chain. In addition, transactions, collaborations, and information flows – not just biophysical flows – are all part of the food supply chain and can contribute to food waste.
Food waste	For the purposes of this project, food waste is defined broadly and inclusively, without attempting to establish a precise definition. We consider any food or drink that isn't utilised according to its original purpose, as well as by-products. We include edible and non-edible components of food and give regard to the variable understandings of food and food waste. The entire food supply chain is in scope.
Freegan	A person who seeks to help the environment by reducing waste, including by taking edible food from dumpsters for consumption and redistribution.
Freestore	A freestore is a food rescue organisation that provides rescued food directly to individuals, with no means testing or questions asked.

Gleaning	Gathering leftover crops from commercially harvested fields or on fields where the producer has decided not to harvest (e.g. because it would not be economically profitable). In this report, we also use gleaning to refer to harvesting surplus produce from private individuals (e.g. a backyard bumper crop).
Kore Hiakai	Established in 2019, Kore Hiakai is a group of social service organisations that advocate for the elimination of food insecurity in Aotearoa. Kore Hiakai focuses on the underlying drivers of food insecurity.
Life cycle assessment	An analytical tool for evaluating the environmental impacts of a product or service through all stages of its life, not just at the end of its life (e.g. when it is disposed of). In the context of food rescue, researchers who undertake life cycle assessments of the environmental impacts of food rescue consider not just the averted environmental harms associated with disposal or alternative waste management approaches, but also factor in the environmental harms that are avoided by capturing existing food for human consumption instead of producing more food.
Means test	An assessment of whether an individual or household qualifies for assistance, based on whether they possess the means to do without help.
Mixed-model food rescue organisation	Mixed-model food rescue organisations are similar to community food hubs, but generally also provide other services such as cooking community meals, running community gardens and composting, or operating foodbanks.
New Zealand Food Network (NZFN)	Established in July 2020, NZFN is a food rescue organisation that receives bulk donations, typically from producers, processors and manufacturers, and wholesalers. NZFN distributes the food it receives to 61 food hubs, usually food rescue organisations, community groups, or foodbanks, which then provide the NZFN food to people in need.
Recipients	People who receive rescued food. Recipients are typically experiencing food insecurity.
Special Needs Grants	A one-off payment from the Ministry of Social Development to help people pay for essential or emergency costs, including food.
Stock shrinkage and wastage	The Commerce Commission defines shrinkage as the loss of grocery products due to theft, other loss, or accounting error, while wastage refers to grocery products that are unfit for sale, for example, due to damage.
Surplus food	Quality, safe, edible food that is at risk of being wasted if it isn't used, distinct from food that is spoiled, damaged, contaminated, past its use-by date, or otherwise no longer fit for human consumption.
Use-by date	Most packaged food in Aotearoa is required to carry a date mark. It is the manufacturer's responsibility to determine the appropriate date mark for its products and include this clearly on packaging. Use-by dates are date marks that relate to food safety. Consumers are advised not to eat food after midnight on the use-by date as the food may be unsafe. Food that has passed its use-by date cannot be donated to the food rescue sector.

Wrap around services	Wrap around services is a broad term that, in this report, refers to additional support or help provided to a person who is accessing food. Wrap around services could include budgeting support, help with housing or access to social welfare, cooking classes, etc.

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As of 8 October 2022

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