



Promising Practices in Food Reclamation in Saskatoon

Farhad Lashgarara, Rachel Engler-Stringer, Freda Atsuyno, Layane Fernandes de Sousa Moura, Hayley Walkeden, and Gordon Enns



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PROMISING PRACTICES IN FOOD RECLAMATION IN SASKATOON

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Printed in Canada

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ACKNOWLEDGEMENTS

The co-Principal Investigator of the project that led to this report is Katie Burns, Community Leadership and Program Development Manager, City of Saskatoon. This project was completed with the support of a Research Junction Grant funded jointly by the City of Saskatoon and the University of Saskatchewan.

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EXECUTIVE SUMMARY

The purpose of this project was to determine promising practices for the City of Saskatoon in diversion of edible food from the landfill. The project builds on food reclamation work that began in 2016 at the University of Saskatchewan and the Saskatchewan Health Authority and waste diversion work initiated by the City of Saskatoon in 2018. The project includes an environmental scan of promising programs and policies in other municipal jurisdictions for reclamation of otherwise wasted food; a small pre/post intervention study of the implementation of a brochure explaining the rights and responsibilities of food businesses in food donation; and a key informant interview study to determine what kinds of support are needed for food businesses to reduce the edible food they currently sent to the landfill.

One-third of the food produced worldwide and 30-40% (or 11 million tonnes) of all food produced in Canada annually is wasted or lost. This report recommends promising practices for reducing food waste in the city of Saskatoon.

To prevent and manage food loss and waste effectively, the food waste hierarchy framework ranks five options. The highest priority is prevention of surplus, followed by re-use, recycling, recovery, and disposal. If surplus cannot be prevented, then redistribution is the next best option. Food redistribution and reclamation rescues edible food that would otherwise be wasted from food services and redirects it to recipient institutions, resulting in environmental, economic, and social benefits.

This report also includes recommendations for increasing food recovery for the City of Saskatoon:

Immediate term (2022-2023)

- Use the findings from this study to integrate food recovery into the Industrial, Commercial and Institutional (ICI) organics regulation implementation that is planned between 2022 and 2024, including:
 - a. Ensure that food donation is compatible with bylaw enforcement procedures.

- b. Highlight donation of edible food as a preferred option throughout education and programming and specifically address the barriers to edible food donation highlighted in this study.
 - c. Have a food donation directory embedded in the ICI “waste wizard” tool and work with community partners to ensure information remains current.
- Enhance community awareness of food waste through piloting the [*Love Food, Hate Waste*](#) campaign, integration of food waste reduction education and programming as part of the implementation of the curbside and multi-unit residential organics programs, and other City sustainability programs.
- Collaborate with the provincial government as it implements its *Solid Waste Management Strategy* and participate in engagement on options for reducing organic and food waste. Share the results of this study as part of that participation.
- Further develop and seek funding with community partners to:
 - a. Address the barriers identified in this study by organizations accepting food donations to further their capacity to accept recovered food.
 - b. Pilot a food recovery social enterprise that will improve local capacity to recover more edible food from the waste stream while creating employment opportunities.
- Include food reclamation and the results of this study in the development of the City’s *Circular Road Map*, which will be completed through *Circular Cities & Regions Initiative* in early 2022.
- Add additional questions in the ICI waste and recycling survey on food recovery to better understand the barriers to food donation.

Medium-term (2024-2025)

- Ensure food waste, including the findings from this study, are included in the *Sustainable Food Action Plan* planned for 2024-2025. Through this work assess the implications of providing municipal support, such as capital, operational or grant funding for food recovery compared to composting through a triple bottom line assessment.
- Assess food-recovery apps and consider procurement as part of the ICI organics regulation education and communications following additional engagement with both food waste generators and the food donation sector.

- Expand the City’s annual environmental cash grant for community organizations to have a food waste reduction and recovery component at \$10,000 per year.
- Improve waste characterization studies and other data collection for the ICI sector to get a clearer picture of food waste in Saskatoon and the sectors that programs should target.
- Request funding to complete a material flow analysis of ICI food waste to better understand the current state of food donation in Saskatoon.

As food-service contracts at City facilities expire, integrate food waste reduction and recovery of edible food into the tendering criteria. Integrate this outcome into the sustainable procurement work planned by the Sustainability Department.

INTRODUCTION

Globally, while in the poorest nations, 805 million people do not have enough food to lead a healthy active life, in the richest nations one-third of all food produced is thrown away. Food is lost or wasted along the whole value chain (Capodistrias, 2015). That approximately one-third of the food produced worldwide is wasted or lost leads to considerable environmental, economic, and social costs (De Gorter et al., 2020).

All 193 United Nations (UN) member states signed a consensus in August 2015 that listed 17 Sustainable Development Goals (SDGs). The current patterns of the food supply chain are deemed unsustainable and global efforts towards meeting the SDGs are taking place. The UN agreed on the need to educate consumers on sustainable consumption and lifestyles, providing them with adequate information through standards and labels and engaging in sustainable public procurement, among other strategies. The UN SDG 12 highlights the need for "responsible consumption and production" and sets a target to reduce by half the per capita food waste in a global scenario by 2030 (Hecht & Neff, 2019). Canada has committed to achieving these SDG targets, which formed the basis of the 2018 Paris (Climate) Agreement and amounts to reducing CO₂ emissions by 28 percent from 2015 levels of 722 megatonnes, by 2030 (Capodistrias, 2015).

Research estimates that 30-40% of all the food produced in Canada annually becomes avoidable food loss or waste—food that could have been eaten but was instead landfilled (Gooch, Felfel & Marenick, 2010). Reducing food loss and waste can benefit Canadians by saving them money, improving the efficiency and competitiveness of the agri-food and agriculture sector, reducing greenhouse gas emissions, and contributing to global food waste reduction efforts (VCMI, 2019).

Given finite natural resources along with the increasing number of hungry people worldwide, the impetus to engage in food recovery practices exists in all developing and developed nations (Otles et al., 2015). There is a trend towards more collaborative interaction among producers, processors, manufacturers, retailers, and consumers (Bortolini et al., 2019). This cooperation creates a window of opportunity to redirect surplus food to alleviate hunger while reducing the amount of edible food sent to landfills (Sgarbossa & Russo, 2017). Whereas surplus food can be

traced at all stages throughout the chain, trends show that in North America the wastage of food is most likely to occur in the consumption stage (De Gorter et al., 2020). According to Holden et al. (2018), the reduction of food waste combined with other techniques such as shifting consumer behaviours (Aschemann-Witzel et al., 2015) could reduce the environmental, economic, and social impacts derived from the system.

The Food Recovery Hierarchy proposed by the US Environmental Protection Agency (EPA) prioritizes efforts that organizations can make to reduce waste within the food system. The first tier of the hierarchy pyramid is to reduce the amount of excess food in the production phase followed by the diversion of surplus food to food recovery organizations (Chen & Chen, 2018).

Waste management is identified as a public utility in the Cities Act, giving municipalities the authority to provide waste management services directly, either through a controlled corporation or by agreement with any person. To achieve this, municipalities often focus on providing residential services such as the collection, recycling, composting, and disposal of household waste. Many municipalities in Canada also contract the private sector to deliver aspects of residential solid waste management services.

Municipalities may play a role in reduction and diversion by providing services directly to residents, enacting policies that encourage waste reduction, and delivering education programs. Specific programs and services in each municipality are influenced by regional factors. The result is slightly different municipal programs across Canada, making a direct comparison between municipalities difficult (City of Saskatoon Sustainability, 2021). For current information on plans and policymaking on waste diversion for the City of Saskatoon, please see the following: <https://www.saskatoon.ca/environmental-initiatives/solid-waste>.

Report purpose and organization

The purpose of this project and report was to determine promising practices for the City of Saskatoon in diversion of edible food from the landfill. The project builds on food reclamation work that began in 2016 at the University of Saskatchewan and the Saskatchewan Health Authority and waste diversion work initiated by the City of Saskatoon in 2018. This report

introduces the concept, causes, and impacts of food loss and waste (FLW). Then, it examines Canada's Food Waste before considering the reasons, practices, and strategies of food waste management. The core of the report focuses on food reclamation benefits, experiences, practices, and programs (with a particular emphasis on Saskatoon), food donation barriers, the required supports for food donation, and the role of social enterprises in food waste diversion. The report concludes with some recommendations.

BACKGROUND

Food Loss and Waste (FLW)

Food Loss refers to food that during its process in the food supply chain gets spilled, spoilt, or otherwise lost, or incurs reduction of quality and value before it reaches its final product stage. According to the Food and Agriculture Organization of the United Nations (FAO, 2015), food loss refers to a decrease in mass (dry matter quantity) or nutritional value (quality) of food that was originally intended for human consumption. Food loss typically takes place at production, postharvest, processing, and distribution stages in the food supply chain. In contrast, Food waste refers to food that completes the food supply chain up to a final product of good quality and fit for consumption, but still does not get consumed because it is discarded whether left to spoil or not. Food waste typically (but not exclusively) takes place at retail and consumption stages in the food supply chain (Bagherzad et al., 2014). Food waste can occur because food has spoiled, but it can also occur for other reasons such as oversupply due to markets, or individual consumer shopping/eating habits.

Broadly, food loss tends to refer to the production side of the food supply chain: food that is produced but does not get consumed by people because it does not make it to market, often (in the developing world, especially) due to inadequate refrigeration, storage, or distribution systems. Most often external factors prevented the food from being consumed—factors such as weather or pests destroying a portion of the harvest, or food rotting due to failed refrigeration (in effect, the producer didn't have a choice in the matter). In contrast, food waste implies that we had the opportunity to consume the food, but we failed to do so. This typically refers to food that

is available for consumption, at market, or at homes, which was ultimately discarded rather than being eaten. Examples include food that we discard from retail stores as blemished or out of date or food that we discard from our plates and refrigerators. Food waste occurs for several reasons, including over-purchasing, poor preparation, inadequate storage, and excessive serving sizes (Finn, 2018).

The term "food loss and waste" (FLW) refers to edible food suitable for consumption that is either wasted or lost for a variety of reasons and at different stages within the food system (Tavill, 2020). Although FLW can be found at all stages of the chain, the amount of FLW in high-income areas is greater in the downstream stages (processing, distribution, and consumption) when compared to low-income regions where FLW is more present in upstream stages (agricultural production, postharvest handling, and storage) (Buzby & Hyman, 2012).

Wasted food can be divided into three categories (Bagherzadeh et al., 2014):

- 1) *Avoidable*: Food that can be easily prevented from going to waste. Reasons for waste include overpreparation, improper storage, or spoilage. Understanding the cause of this waste is key to preventing it.
- 2) *Possibly avoidable*: Food that may seem inedible but can be used or repurposed.
- 3) *Unavoidable*: Food that cannot be consumed by people and should be used for animal feed, compost, or anaerobic digestion.

The United States Environmental Protection Agency (EPA, 2010) estimates that approximately 22% of municipal solid waste consists of food waste, which means that food is more likely to be thrown into the landfill than any other single item. Moreover, the EPA also estimates that of the total food waste generated in the USA, only a little over 6% is diverted from the landfill.

Globally, the FAO estimates that the total volume of edible food that is either wasted or lost is approximately 1.3 Gtonnes. In Canada, research conducted by the National Zero Waste Council (2015) has shown that yearly the average Canadian household wastes about 140 kilograms of food that was still suitable to be eaten.

Origin and Causes

The drivers of food waste are varied and complex and occur at every point along the supply and consumption chain (National Food Waste Strategy, 2017), including:

- A- Primary production.** Product loss due to pests and diseases or weather, damaged or discarded during production, packing or handling, fall in market prices making it unprofitable to harvest, inability to meet contracted produce specifications, such as quality or size, and changes in consumer tastes and preferences.
- B- Processing and manufacturing.** Product damaged during handling, spoilage due to contamination or inadequate temperature control, excessive trimming of vegetables for processed foods, changes in production due to consumer demand, equipment failure, spillage on conveyor belts and transfer points, inefficient inventory management, and damage to packaging resulting in food unfit for sale.
- C- Distribution.** Spoilage due to inadequate temperature control in transport and storage and damage due to improper handling.
- D- Retail.** Poor stock management, including over-ordering, improper stock rotation, storage, and handling practices, produce no longer meets quality standards, last-minute order changes that can leave suppliers with excess product, and limited access to facilities to recycle or repurpose food waste.
- E- Hospitality and foodservice.** Poor stock management, storage, and handling practices.
- F- Households.** Confusion over 'use-by' and 'best-before date' labeling, over-purchasing of food that is then thrown away, limited knowledge of how to safely repurpose or store food leftovers, and limited access to food waste collection systems.

The main drivers and sources of waste from viewpoint of the World Biogas Association (2018) are shown below:

- A- Manufacturing.** Over-production resulting from pressure to meet contractual requirements, appearance quality standards for produce, damaged products, cheap disposal alternatives, inedible parts of produce.
- B- Wholesale and retail.** Temperature changes leading to spoilage, aesthetic standards expected by the consumers and retailers, packaging defects making produce not fit for

sale, over supply due to consumer choices, overstocking due to poor planning and excess surplus.

C- Food services. Lack of flexibility in portion sizes, insufficient planning in forecasting and ordering ingredients, consumer attitudes towards taking leftovers home, refused food due to not meeting customer preferences.

D- Households. Buying too much due to poor planning, bad storage resulting from lack of awareness, confusion over freshness and safety labels, discarding edible parts of products like bread crusts or apple peels, discarding leftovers, large portion sizes.

Consequences

Food is the largest contributor to solid waste, causing states and municipalities concern over dwindling landfill space. While in the landfill, food waste also causes significant environmental harm through its methane emissions. The growing, processing, packaging, and transport of food that will eventually end up in the landfill also wastes a significant amount of time, energy, money, water, and fossil fuels. Food waste is a drain on the environment, economy, and communities. The social harms caused by food waste make a governmental investment in food waste reduction money well spent (Uzea et al., 2014).

According to the World Biogas Association (2018), the primary impacts of food waste are as follows:

A- Environmental impacts of food loss and waste. FLW causes impacts on climate change due to GHG emissions throughout all stages of the supply chain as well as impacts on biodiversity due to land and water usage (Scherhauser et al., 2018). Apart from the well-known impacts of greenhouse gas emissions on biodiversity, the waste of edible food also causes a considerable loss of resources used along all stages of the food supply chain (Tonini et al., 2018). Food waste is also a major component of waste going into municipal landfills, a significant source of methane.

B- GHG emissions and climate change. In the stage of agricultural production, the processes of fertilizer application and livestock farming are known to generate emissions of nitrous oxides and methane, respectively (Scherhauser et al., 2018). In the Food Wastage Footprint (FWF) report FAO (2013), it is estimated that the carbon footprint of

food waste and loss is approximately 3.3 Gtonnes of CO₂ equivalent which makes food wastage the third top emitter after the United States and China. Examples of greenhouse gas emissions from food waste include change in land use from forests to agriculture causes and the release of carbon that was stored in the cleared biomass; emissions from livestock and manures and slurries; from burning fossil fuels to produce energy for - operating farm machinery; heating farm buildings and greenhouses; processing food (e.g., pasteurization); and refrigerating and transporting of food. When wasted food is disposed of in landfill sites or dumpsites, it decomposes and releases further emissions into the atmosphere.

C- Water footprint. Wastage of food results in the waste of water extracted from the ground or surface water bodies for irrigation. It is estimated that the blue water footprint for the agricultural production of food that ends up being wasted is approximately 250 km³ which is three times the volume of Lake Geneva. The use and subsequent runoff of fertilizers and pesticides harm the water quality of ground and surface water bodies.

Leachate from dumpsites and landfills pollutes the groundwater as well as surface water. Where poorly regulated, untreated wastewater from food processing industries pollutes surface water bodies.

D- Nutrient loss. With a growing population and increasing wealth and consumption, there is increasing pressure on already limited agricultural land supplies to produce even more food. Recycling food and agricultural waste and human excreta to soil have been a continual practice. Only in the last century have soils been subjected globally to intensive agricultural practices and the use of synthetic fertilizers.

E- Other Ecological impacts. Increased food production to support the growing global population has resulted in widespread ecological damage from change of land use from forests, prairies, peat, marshes, etc., to agriculture; loss of biodiversity of species, including mammals, birds, fish, and amphibians; and over exploitation of marine life. The impacts of this damage from food production at the global scale have been felt in the form of loss of biodiversity, soil quality, marine population, and many other such indicators.

F- Socioeconomic Impacts. The second most prominent level of the food recovery hierarchy (EPA) is "feed hungry people". According to the United Nations, in 2018

approximately 821 million people experienced hunger around the world (Friedrich, 2018). In Canada alone, according to the Canadian Community Health Survey (CCHS), more than 12 % of households suffered from hunger in 2012 (Brown & Tarasuk, 2019). In total, approximately four million people in Canada had experienced some level of food insecurity that year, which compromised their life quality and health outcomes (Mendly-Zambo & Raphael, 2019; Tarasuk et al., 2019). Food insecurity is understood as the insecure or unsuitable access to quality and/or sufficient food due to financial reasons since it is closely tied to socioeconomic vulnerability (Loopstra et al., 2019). In developing countries with significant political and economic instability (Spiess et al., 2013), FLW causes even larger and unprecedented impacts especially for low-income individuals and vulnerable households (Seaman et al., 2014). FLW generates a loss of roughly \$750 billion per year from the global economy (MacRae et al., 2016). In Canada alone, this deficit is estimated at \$49 billion per year (Gooch et al., 2010); although, some studies estimate this figure to be even higher due to other inputs embedded in the process (Gooch et al., 2010). In the worldwide context of Covid-19, the levels of food insecurity globally are expected to be far higher when compared to the years before the pandemic situation (Gundersen et al., 2020).

Food Waste in Canada

In Canada, the equivalent of 30-40% of the food produced annually along the value chain is wasted. Much of this food ends up in landfills or as compost. This food waste has been estimated to be worth approximately \$31 billion each year or 2% of Canada's GDP (Gooch & Felfel, 2014). However, when all costs of food production are factored in, including land, water, transportation, energy, etc. the cost of Canada's food waste exceeds \$100 billion annually (Macdonald, 2019; Gooch et al., 2010). Gooch et al. (2010) report the following percentages of food waste throughout the chain (field to home) in Canada: field 9%, packaging/processing 18%, transportation/distribution 3%, retail store 11%, foodservice/ HRI 8%, and home 51%. 70% of this waste occurs in stores, restaurants, and homes.

The FAO estimated that the cumulative cost of associated wastes (energy, water, land, labour, capital investment, infrastructure, machinery, transport, etc.) represents only 29% of the true cost

of food waste and is approximately two and a half times greater than the "face value" of wasted food. Using this formula, the true cost of food waste in Canada would be \$107 billion. In addition, the greenhouse gas emissions footprint of food waste is significant, including about 20 percent of Canada's methane emissions, a more potent greenhouse gas than carbon dioxide, coming from landfills.

Food insecurity affects more than 4 million Canadians (Brown & Tarasuk, 2019). This figure represents approximately 1 in 8 households struggling to afford the food they need. Evidence continues to mount that the health and well-being of Canadians experiencing food insecurity is jeopardized as a result. Food insecurity erodes people's health, predisposing them to the development of physical and mental health problems and making them less able to manage any chronic health conditions they have (Brown & Tarasuk, 2019).

Food Waste Reduction and Reclamation

The terms food reclamation, recovery, rescue, diversion, reuse, recycling, retrieving, restoring, rehabilitation, and renewal refer to "the act of rescuing edible food—that would otherwise be wasted—from food services and redirecting it to recipient institutions" (Vilariño et al., 2017). Recipient institutions include food waste transformation organizations, food banks, and other not for profit and charitable organizations that rely on the donation of surplus food through growers, processors, retailers, and the general population (Tarasuk, Fafard St-Germain and Loopstra, 2019).

Food recovery and redistribution is the process of obtaining surplus, edible food from across the supply chain and redistributing it to local food programs or commercial enterprises that can use this resource, maintaining the highest value of food as nourishment for people. While recovery and redistribution of safe, surplus food that would otherwise be lost or wasted across the supply chain makes the best use of resources that have gone into growing and producing it, this activity is not proposed as a solution to addressing food insecurity (Tarasuk et al., 2019).

Although reducing food waste in medium and high-income countries may not directly help tackle food insecurity in low-income countries, it reduces competition for limited water, land,

and biodiversity resources, making these resources available for other uses. Edible food that would otherwise be wasted could be redistributed in local communities in medium and high-income countries, and low-income countries alike. Reducing food waste can increase the efficiency of the food supply chain and bring economic benefits, including lower costs for businesses and lower prices for consumers (Bagherzadeh et al., 2014).

Food Waste Hierarchy: A Framework for Food Waste Management

In recent years, food waste has become widely recognized as a massive global problem. To effectively prevent and manage food loss and waste, the food waste hierarchy framework was introduced and applied within national law in many countries. The hierarchy was originally known as The Revised EU Waste Framework Directive 2008, which provides the basic concepts and the guideline to manage waste by ranking from the five most to least favorable options that would negatively affect the environment and human health.

The highest priority option is **prevention**, followed by preparing for **re-use**, **recycling**, **recovery**, and **disposal** as the last option (Environment and Climate Change Canada, 2019). It also states that the most desirable practice is to avoid food and edible materials being wasted at the beginning of the food supply chain that primarily aims to achieve the best environmental impacts. Nevertheless, WRAP (Waste and Resources Action Programme) adds the suggestion to the second-best option of the hierarchy that If surplus cannot be prevented, then *redistribution* to people and then animal feed is the next best option. The later steps of WRAP's food waste hierarchy are to recycle food waste by sending it to anaerobic digestion and composting, bring food waste to undergo energy recovery, and the worst action is to dispose of food waste to landfill (Environment and Climate Change Canada, 2019).

Food waste reduction strategies have been classified according to the categories of the inverted 'food waste pyramid', which represents the most to the least environmentally friendly categories (Figure 1).

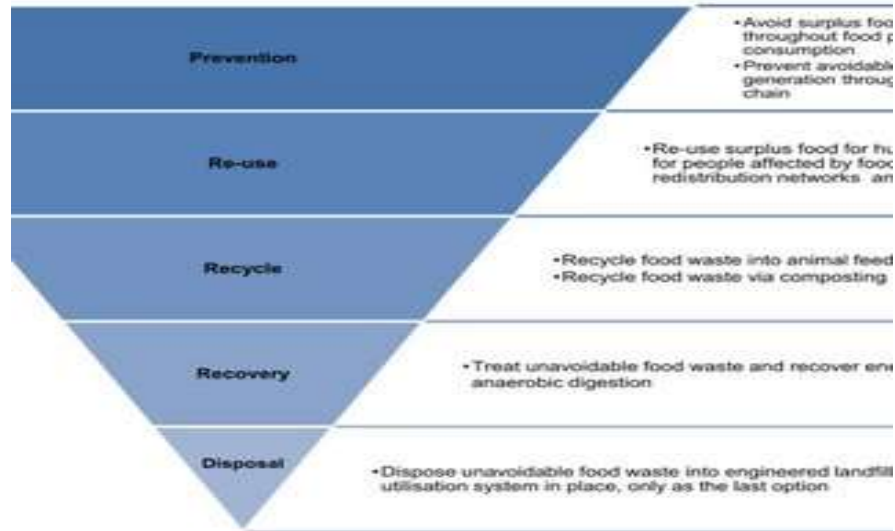


Fig. 5. The food waste hierarchy.

Figure 1: Food Waste Hierarchy

(Environment and Climate Change Canada, 2019).

A- Reduce (Prevention). Preventing food waste reduces the use of resources required for food production, labour and disposal costs, and reduces all the environmental, economic, and social impacts linked to food waste disposal. As the impact of food production on natural resources is enormous and increases while the food progresses on the food value chain, reducing food wastage is by far the best way of reducing the waste of natural resources. Prevention is the most efficient way to deal with food wastage, as it is about limiting food wastage on the front end, while the other categories are about food wastage management.

B- Reuse. Reusing food waste mainly involves redistributing it to alternative markets and, for example, using the surplus for new business options, charities, clearance houses, or animal feed. Reuse is the next best option after source reduction. Reuse finds a secondary way to obtain value from an item that would otherwise be wasted. In foodservice, the most common reuse opportunities involve 1) redeploying overproduced food elsewhere on the menu and 2) donating to a food recovery program that will transform the food or provide it to those in need.

C- Recycle/Recover. Recycling means turning waste into a new substance or product, such as compost, while recovering implies the production of energy from waste (i.e., through

anaerobic digestion). This category, therefore, comprises the processing of wastage into nutrients and/or energy. The main recycling and recovering options are by-product recycling, anaerobic digestion, composting, incineration with energy recovery, and rendering. All these options allow energy or nutrients to be recovered. Recovery is the final good option before disposal by diverting the waste from the landfill or elsewhere in the solid waste stream and ensure ongoing value when the item is converted into something useful, such as a soil amendment with composting (LeanPath, 2008).

D- Landfill. Landfills should be the last resort option for food waste management.

Landfilling organic waste causes the emission of gases such as methane and potentially pollutes soil and water, let alone odour and other societal nuisance (FAO, 2015).

According to the EPA (2010), food waste reduction policies should include the following:

- A- Food purchasing policies.** Create guidelines and goals to reduce spoilage and waste, Specific policies can include a system to identify over-purchased food items and avoid excess wasted food, purchase pre-cut food to reduce prep waste, implement a "just-in-time" purchasing system to order only what is needed when it is needed and use the Food and Packaging Waste Prevention Tool to determine areas of over-purchasing and waste.
- B- Storage techniques.** Ensure that food products are stored under the proper conditions (for example, temperature); use older products first and find products when needed.
- C- Food reuse/repurposing.** As long as proper food safety and handling practices are followed, reusing leftover food can save money and reduce waste. Creative repurposing of leftovers and trimmings to efficiently use excess food for other meals is important.
- D- Training staff.** While individual managers can influence the amount of food wasted, foodservice staff is ultimately responsible for day-to-day food storage, organization, preparation, and disposal. Continuous training and acknowledgment of staff is crucial to ensure proper training of all employees, especially if there is high turnover. Foodservice managers should educate staff on basic steps to minimize food waste, including proper storage and organization practices to ensure food does not spoil before use; cooking and preparing food to reduce prep waste and food sent back to the kitchen; refining knife skills to reduce improper preparation, reducing batch sizes when reheating foods like

soups or sauces to avoid leftovers, plating practices to reduce unnecessary food waste and waste tracking efforts.

FOODWIN (2018) offers these tips for food waste management:

- A- Developing communication campaigns.** Many public and private actors have started campaigning against food waste to reduce food waste and reuse food when waste wasn't avoidable, and multiple events such as public banquets have been organized all over Europe to raise awareness among businesses, governments, and the public on the levels of international food wastage and to showcase positive solutions to the issue. Retailers have also started campaigns on better shopping and better food management at home.
- B- Promoting food wastage audits.** Rigorous, ongoing, and consistent food wastage tracking is the best way to identify opportunities, make adjustments, and reduce food wastage. However, a good first step on this path to prevention is a food waste audit. Typically conducted over a short period, an onsite audit involves weighing and tracking all waste to get a "snapshot" of the amount of waste generated. This can be done at all supply chain stages and can be as easy as taking notes on what food you waste the most and weighting your waste or can be more sophisticated using company toolkits.
- C- Improving communication along the supply chain to match demand and supply of food.** The discrepancy between demand and supply, a major cause of food wastage, ranges from farmers not finding a market for their products and leaving them to rot in the field, to cooking in quantities that are too large, to supermarkets downsizing product orders at the last minute, leaving producers with unsalable products. As a result of miscommunication and perverse signals and incentives all along the supply chain, food is lost or wasted and, together with it, all the natural resources used to create it. Tackling food wastage requires better communication between the different parts of the supply chain to better balance supply and demand.
- D- Improving communication between the different stakeholders in the supply chain.** The different actors involved in the food supply chain (e.g., producers, food processors, retailers, consumers) are heavily interdependent and their actions and practices influence each other's decisions. Supply chain efficiency could be greatly improved by enhancing communication among the different stakeholders. In addition to increasing business

among the parties, sustained dialogue also helps reduce product rejection by buyers and, at the same time, increases the stability of the offer for the buyer.

E- Developing improved food harvest, storage, processing, transportation, and retailing

processes. Food losses that occur during harvest, post-harvest, and processing phases are most likely in developing countries, due to poor infrastructure, low levels of technology, and low investment in the food production systems. In developed countries, food waste mostly occurs further along the supply chain, at the retailing and consumption levels.

Harvest losses have several causes, including the timing of the harvest, as well as harvesting techniques, equipment, and conditions. Sometimes, poor farmers must harvest crops too early due to food deficiency, or their desperate need for cash during the second half of the agricultural season. As a result, the food loses both nutritional and economic value and may be wasted if it is not suitable for consumption.

It is the same for post-harvest losses. Fresh products can spoil quickly in hot climates due to a lack of infrastructure for transportation, storage, cooling, and markets. New technologies have been developed to improve storage as have green technologies, such as solar dryers that improve the lifetime of products in storage and, in turn, increase food security and economic benefits for the producers.

F- Improving processing techniques. Lack of processing facilities causes food losses in developing countries. In many situations, the food processing industry can't process and preserve enough fresh farm produce to meet the demand. Part of the problem stems from the seasonality of production and the cost of investing in processing facilities that will not be used year-round. In developing countries, investment and capacity-building initiatives are key to improving processing facilities. In developed countries, processing facilities are also a major source of waste. This happens mainly during trimming, which removes both edible portions (e.g., skin, fat, peels, end pieces) and inedible portions (e.g., bones, pits) from food.

G- Improving transportation. Improving transportation to reduce food waste through improving the means of transportation (e.g., boat, rail, and roads), the condition of transportation (e.g., refrigerated vehicles), and eventually reducing the number of kilometers to be covered by creating market options closer to the production place.

According to Saha and Nande (2015), the benefits of food waste reduction and diversion include those related to the **environment** (i.e., reduction of greenhouse gases and other air pollutant emissions, water conservation, renewable energy), **economics**, and **society**.

A- Environmental benefits. Reducing food waste offers environmental benefits by avoiding emissions and other impacts of producing, processing, and transporting food. According to Rethink Food Waste Through Economics and Data (ReFED), avoiding the agricultural inputs and transportation of 1 ton of food through prevention has on average a 2–10 times larger greenhouse gas (GHG) reduction compared to recycling 1 ton of food. Improved land, air, and water quality would result from reductions in leachate and greenhouse gas emissions, as more edible food is diverted from landfills.

B- Economic benefits. Every ton of food waste diverted contributes to potential annual savings of thousands of dollars in landfill costs. Reducing food waste also reduces trash pickup costs. By decreasing the amount of food wasted, businesses pay less to dispose of their trash. Some haulers charge less if the food waste is separated from the trash and sent for composting rather than landfilling.

By making strides to prevent food waste, businesses can reduce costs by purchasing only the food that will be used or decreasing improperly prepared foods. Additionally, reducing food waste can increase staff efficiency and reduce energy and labor associated with disposing of food. A recent study estimates that our food industry could reduce its operating costs by 15% – 20% by reducing food waste. Cities would cut food waste management costs by an estimated \$41.5 million per year. The broader economy would also save money, owing to lower consumption of water and other resources, used in production and storage, and greater food security.

C- Societal benefits. Job creation and feeding hungry people is the second tier of the hierarchy, where manufacturers, supermarkets, wholesalers, farmers, and food brokers can give "expired" or otherwise unmarketable, but still viable food to food rescue and transformation organizations or food banks. By feeding people and not landfills, we can help mitigate the worst effects of poverty and save money from landfilling edible food. We can also create jobs in food transformation and sales for people struggling to find jobs, thereby giving opportunities to get out of poverty.

Donating surplus commercial food is an effective method to simultaneously reduce food waste, create jobs in food transformation and feed hungry people. However, donating food can be expensive because it requires money to harvest, package, store, and ship food that otherwise would be discarded. Tax credits or deductions can help offset that expense by offering food donors an economic incentive for food donations (Harvard Food Law and Policy Clinic, 2016). One reason that healthy, wholesome food goes to waste is cost. Food donation is costly and can be challenging; it is not as simple as just taking surplus food from one place to another. Businesses and organizations generally bear the cost of harvesting or preparing food for donation, storing it, transporting it, and ensuring it complies with food safety and labeling laws (Harvard Food Law and Policy Clinic, 2016).

According to Braham et al. (2014) the main barriers to food donation are as follows:

- A- Lack of awareness.** This awareness issue represents the most significant hurdle to increasing restaurant food donations. Many restaurant managers and operators claimed that they did not generate enough leftovers to be able to donate. Some restaurant managers identified alternative methods to reduce food waste, including incorporating excess ingredients into soups, salads, and daily specials and allowing employees to take home leftovers. In addition, many of the restaurant managers did not know that they could donate their surplus food or know to which organizations they could donate. Restaurant patrons and the public also have low awareness of food waste and do not expect food donation or food waste reduction practices. Restaurants do not advertise their food donation practices, and consumers do not pressure them to donate.
- B- Costs and logistical barriers.** In terms of the factors holding food donors back, retailers are largely influenced by the idea that it is cheaper and easier to send wastage to the landfill, although higher landfill taxes are now working as a deterrent. Lack of funds for the organization of logistics, namely transportation, is one of the most limiting factors in food redistribution (Thang, 2009). For many restaurant owners and operators that do overcome the first awareness barrier, the following cost and logistical challenges may still inhibit regular food donation:

Inefficiency: Most restaurant operators are willing to donate their surplus food if it did not increase their expenses. Many would prefer volunteer-led pick-ups to minimize restaurant

staff time required. However, nonprofit recipient organizations and some food recovery intermediaries may also lack the volunteer base to provide such labor.

Equipment constraints: Food donors and/or recipients need cold storage units to safely keep perishable food items. They also need insulated containers and refrigerated vehicles to transport food. These equipment costs can prohibit donations.

Incompatible Scheduling: Restaurants can have unpredictable availability of leftovers and may need the flexibility to arrange ad hoc donations. Limited storage space may necessitate that food donations be picked up the same day that leftovers become available. This can create difficulties in coordinating with recovery or recipient organizations since restaurants often close down after midnight.

C- Food Safety Concerns. Many restaurant managers, even those with both the awareness and the capability to take on regular food donation activities, are nevertheless put off. The factor that has most restrained businesses from donating food surplus is undoubtedly the risk of being held legally liable in case of intoxication, illness, or other injuries due to the consumption of (mishandled) donated food. To incentivize food donations and avoid, at the same time, great quantities of edible food being thrown away, many governments have implemented acts and regulations aimed at protecting food donors from criminal and civil liability should the product—given away in good faith—cause any injury to a person. In Canada, this is the Donation of Food Act 1994. However, restaurants are frequently unaware of the legal food safety requirements related to donating leftovers. Charitable organizations may also omit restaurants from food donation program sourcing due to perceived legal issues.

D- Relationship barriers. Bridging the gap between restaurants that have food to donate and charitable organizations that want it requires time and effort to build and maintain relationships. Strong relationships between restaurants and recipients are often built on a personal basis, which presents a challenge to scaling up existing food donation programs. Trust between food donors and recipients can also be crucial. Both restaurants and nonprofits mentioned concern that partners might not handle food safely or might be otherwise unreliable in terms of coordinating donation logistics. Forging strong relationships between restaurants and recipients can be vital to both initiating and sustaining food donation efforts.

The World Biogas Association (2018) has also proposed some regulatory incentives for better food reclamation:

- A- Food date labeling.** While some date labels on food bought from grocery stores refer to food safety (for example, 'use by'), others are targeted towards food quality (for example, 'best if used by' and 'display until'). The meanings of these labels are often unclear to the consumers and lead to wastage of food that is still edible and safe to consume. There has been a call for action to use only one date label on a product and educating the consumers on its meaning via in-store displays, web service, and public service announcements.
- B- Supermarket food waste recovery requirement.** Regulatory requirements, such as banning the destruction of edible food by the addition of water or bleach unless it poses a real food safety risk, may be enacted to encourage redistribution and energy/ nutrient recovery from the food.
- C- Banning of organic waste to landfills.** The EU Landfill Directive obliges member states to reduce the amount of biodegradable waste going to landfills to 35%. Some EU member states have gone further and banned any food waste from landfills (such as Germany, Austria, and Sweden). Such laws have been enforced in some states in the USA, and also in the City of Vancouver, Canada.
- D- PAY-AS-YOU-THROW (PAYT).** 'Pay as you throw (PAYT) schemes charge the producers of food waste for the disposal of the waste they generate based on the waste's weight/volume. Seoul (South Korea) has reported a 10% reduction in food waste generation after the implementation of such a collection method. PAYT schemes have a direct impact on the profit or expenditure of the business or household and are an effective tool for food waste prevention, as well as contributing towards the funding of collection/ treatment.

METHODS

This report is the culmination of a project that includes three components. The first component is an environmental scan of promising programs and policies in other municipal jurisdictions for reclamation of otherwise wasted food (see Questions 1-3 below). The second component is a small pre/post intervention study of the implementation of an already developed brochure explaining the rights and responsibilities of food businesses in food donation, and listing when, where and what to donate (see Question 4 below). The third component is a key informant interview study to determine what kinds of support are needed by food businesses to reduce the edible food they currently send to the landfill (see Question 5).

In order to determine promising practices for the City of Saskatoon in diversion of edible food from the landfill, we answered the following questions:

- 1) What are promising practices for food reclamation from other Canadian cities (and beyond)?*
- 2) What roles do municipal governments play in food waste mitigation in other Canadian cities (and beyond)?*
- 3) What are promising practices for funding of food waste mitigation from other Canadian cities (and beyond)?*
- 4) How does the volume and quality of food donations to charitable organizations change upon distribution of a brochure to food businesses explaining how to donate edible food that would otherwise be wasted?*
- 5) How can restaurant owners/managers and small and large grocery store owners/managers in Saskatoon be supported to reduce the edible food wasted from their businesses?*

Data Collection

For the environmental scan (answering questions 1-3) we collected data in several ways. First, we reviewed the peer reviewed and grey literature on the topic of food waste reduction at the municipal level. LFM took the lead on the initial review which was then supplemented by FL. We developed our literature search terms in partnership with a University of Saskatchewan

Health Sciences Librarian. We examined policies, practices and interventions in cities in Canada, and beyond where needed, with a focus on cities that are comparable to Saskatoon. We also examined any literature specifically discussing how municipal governments are involved in reducing food waste.

Once we conducted a thorough examination of the peer reviewed and grey literature, we supplemented our literature review by calling relevant municipal officials from various Canadian cities, with a focus on medium-sized cities most comparable to Saskatoon (done primarily by LFM). Given that we did not expect to find a lot of published literature on this topic (whether peer reviewed or grey) we found that calling city officials and conducting short interviews supplemented our data. We asked questions about food waste mitigation strategies, the role of their municipal governments in these strategies and how initiatives are funded.

The preliminary pre/post intervention study aspect of this project addresses the question (number 4 in our questions) of how the volume and quality of food donations to charitable organizations changes upon distribution of a brochure to all food businesses in Saskatoon explaining how to donate edible food that would otherwise be wasted. The brochure was previously developed in partnership with the former Saskatoon Health Region, now Saskatchewan Health Authority (SHA) and describes the regulations around edible food donation, where to donate, what different organizations accept and when they are open to receive food. The SHA used their food services businesses list for public health inspection to create a list of businesses to send the pamphlet to and mailed out the pamphlets to all food businesses on their list. The original plan for this project was to have Public Health Inspectors distribute the pamphlet directly to food service establishments during regularly scheduled inspections; however, due to the increased workload of the COVID-19 pandemic, this was not possible.

We developed a short interviewer-administered survey with both open-ended and closed-ended questions that examined donation practices by food businesses to recipient community-based organizations which were conducted by LFM (see Appendix A). Prior to the food donation pamphlet being sent out, we conducted interviews with relevant staff at the Saskatoon Food Bank and Learning Centre, the Friendship Inn, The Lighthouse, and EGADZ. The same interview questions were asked again six months after the pamphlet was mailed out to all food businesses, this time by GE. We consider this a preliminary study given we were not able to

measure quantitatively the changes in food donations pre/post intervention, but rather we asked the organizations to identify qualitative and quantitative changes that they perceived.

To answer our final question determining what kinds of support are needed by food businesses to reduce the edible food they currently send to the landfill, FA and HW conducted key informant interviews with managers/owners of various types of food businesses in Saskatoon. Through our partnership with the Saskatoon Food Bank and Learning Centre and the Friendship Inn, as well as cold calling additional businesses, we sampled independent and chain restaurants, convenience stores, medium and large grocery stores, independent and chain cafes, and hotel and banquet facilities (n=15 total). We developed a semi-structured interview guide to collect information on the barriers to food donation and what sorts of supports these food businesses might need to increase their edible food donations (see Appendix B).

Data Analysis

Analysis of the data examining policies and practices of municipal governments and organizations primarily involved examining and summarizing by asking four questions: 1) What are the described program/policy successes and challenges? 2) Have any formal evaluations of the program/policy implementation been conducted and if so, what have their results shown? 3) What has been the role of the municipal government in the program/policy and what do municipal staff perceive the benefits and challenges of their role to be? 4) How has the program/policy been funded, has evaluation of this funding model been conducted and what have been the benefits and challenges of this funding model?

The pre and post intervention interview responses were audio-recorded, notes were taken and analyzed and themes were developed. A similar process was used for qualitative analysis of the key informant interviews with food business managers and owners.

FINDINGS AND DISCUSSION

First, we summarize policies and programs in Canada that contribute to food reclamation. Next, we present a few examples of international programs and policies that also might be helpful for development of food reclamation policies and programs for Saskatoon. Next, we discuss the changes in food donation practices as a result of our mini-intervention and the main barriers reported by food service industry owners and managers.

No national policies focus on food waste within Canada. However, Environment and Climate Change Canada (2019) offers some actions that could contribute to reducing FLW, including:

- A- **Improving awareness and education.** Several resources have been developed by governments, industry, and non-governmental organizations to improve awareness of the causes and solutions to household and consumer food waste. Of note is the [Love Food Hate Waste \(LFHW\) Canada](#) national awareness campaign launched in 2018 by the National Zero Waste Council (NZWC) with retail and municipal partners. British Columbia's Ministry of Environment and Climate Change Strategy's [resources on food waste](#) were developed to raise consumer awareness regarding the impact of food waste and to share solutions for reducing wasted food. Educational resources on food loss and waste, developed by [Second Harvest](#), [La Tablée des Chefs](#), [Halton Food Council](#), and others, are available to support elementary and secondary school teachers. The [Commission for Environmental Cooperation](#) (CEC) recently published a [Food Matters Action Kit](#) that contains informative resources and hands-on, creative activities to inspire North American youth to prevent food waste at home, at school, and in their communities. The Quebec Ministry of Agriculture has published [consumer guides](#) (French only) on date labels, food storage, food preparation, and food cleaning.
- B- **Increasing food literacy.** One pillar of Health Canada's [Healthy Eating Strategy](#) is an effort to improve the food literacy of Canadians. Improved food skills can help decrease household food waste by helping consumers to shop wisely and make the best use of the food they purchase. There are many Canadian initiatives focused on improving food literacy – one example is "[Regroupement des cuisines collectives du Québec](#)" which

coordinates small collective kitchens to enable people to share time, money, and skills in planning, purchasing, and preparing healthy and economical dishes for their families.

- C- **Standardization and education on date labels.** Improving clarity and understanding of "best before" date labels could contribute to better decision-making regarding the edibility of food and reduce premature disposal. The Canadian Food Inspection Agency (CFIA) is reviewing national "best before" and "expiry" date labelling requirements and will introduce education programs to improve consumer understanding. Food processors Kellogg's, Walmart, Campbell Soup, Nestlé, Unilever, and other multinationals have signed a [Call to Action](#) to standardize food date labels worldwide in 2020.
- D- **Packaging.** Food waste can be reduced by packaging products in quantities that can be consumed within their expiry date, and in shapes that encourage full use.
- E- **Product innovations.** Canadian research has focused on developing innovative approaches to prolonging shelf life. For example, Agriculture and Agrifood Canada has done research on packaging and decontamination processes to identify technologies that will increase storage and shelf life, such as antimicrobial coatings for food packaging films to decrease food contamination risks. The McGill Research and Innovation Consortium on Food Processing studies approaches to increase the shelf life of foods including natural antimicrobials, high-performance packaging, nanoparticles, and encapsulation. The Quebec Agrifood Innovation Centre (QAIC) research on optimizing meat packaging and using hydrostatic high-pressure processes to prevent meat losses and increase product shelf life.

Provincial Policies and Programs

Some provincial governments recognize food recovery practices as an opportunity to reduce environmental impacts and at the same time address food insecurity or create jobs. Nova Scotia and Prince Edward Island have implemented organic waste disposal bans, and Quebec and Ontario will be following suit by 2022 (MacDonald, 2019). The Government of Nova Scotia enacted a ban on landfilling materials that can be diverted, including recycling and organics. The ban applies to both the residential and ICI sectors. After the adoption of an organic waste ban, Nova Scotia saw a drop between 231,400 and 261,900 tonnes over 12 years in greenhouse gas CO₂-eq emissions (MacDonald, 2019). Nova Scotia has the lowest waste rate in Canada,

and that is because of the early efforts made by the government to combat this growing issue (Wagner & Arnold, 2008). However, a notable gap identified in Nova Scotia's regulation is the lack of a Food Donation Care Act. All provinces, except Nova Scotia and Quebec, have a Food Donation Care Act freeing persons or corporations from any liability for the foods donated.

The provinces of British Columbia, Ontario, Quebec, and Nova Scotia provide tax credits or deductions for farmers to help offset the cost to harvest, package, and store food for donation. Quebec additionally provides a tax credit for the donation of certain foods by food processors. Two key pieces of Ontario provincial legislation facilitate the redistribution of food for donation. As part of the Local Food Act, 2013, the Taxation Act, 2007 has been amended, providing farmers with a tax credit of up to 25% of the market value for donated produce, in addition to the existing charitable donation tax credit.

In 2016, the government of Ontario published the Resource Recovery and Circular Economy Act, which required the development of a strategy named "Waste-Free Ontario: Building the Circular Economy" within 90 days of the Act published. The Waste-Free Strategy cites as one of its many actions the creation of the "Food and Organic Waste Framework" plan to reduce the amount of food waste sent to the landfill. In developing this action plan, the province considers food donations and recovery practices as one of the measures to achieve a significant reduction in food waste in the province.

To achieve the circular economy, Ontario plans to focus on reducing food waste, recovering resources, supporting resources recovery infrastructure, and promoting beneficial uses of said recovered resources (MacDonald, 2019). With over 2.2 million tonnes of terminal food waste occurring in the province, the province proposed a food and organic waste framework in November 2017. Most notably, the document states that the province will develop and implement a food and organic waste disposal ban, which will be added to the Environmental Protection Act.

Ontario also has a feed-in-tariff (FIT) program, which was developed in 2009, that provided a preferential revenue stream to electricity generated from sources such as biogas from anaerobic digestion of organic waste. Provincial regulation 101/94 requires any municipality with a

population of over 5,000 to provide home composters to residents, with green bin collection in municipalities with a population greater than 50,000.

Ontario has also recently begun a new initiative especially focused on improving food recovery in the commercial sector. The project, titled "Improving Food and Food Waste Recovery in the Non-Residential Sector Through Co-operative Collection", aims to aid in collaboration between the waste generators and waste services. The primary goal is to build a successful collection model that will not only be cost-effective but also allow for maximum food recovery (MacDonald, 2019).

In British Columbia, the Ministry of Environment has produced a toolkit for Residential Food Waste Prevention where it is mentioned the donation of surplus food as a sustainability benefit for food waste prevention.

The Province of Saskatchewan does not regulate the diversion of industrial, commercial or institutional waste and is expected to maintain its current focus on residential waste diversion programs; however, in 2020 it did release a [Solid Waste Management Strategy](#) that specifies significant waste reduction targets (30% by 2030 and 50% by 2040). The strategy does not specifically discuss food waste.

Municipal Policies and Programs

[Canada's National Zero Waste Council \(NZWC\)](#) began in Vancouver, BC, in 2013, and works in collaboration with the Federation of Canadian Municipalities. The organization's mission is to "act collaboratively with business, government and the community, at the national and international level, as an agent of change for waste prevention and reduction in the design, production, and use of goods." NZWC has developed a Food Loss and Waste Strategy for Canada to outline how Canada can combat food waste nationally. The council has also called on the federal government to support a tax credit to encourage businesses to donate what would be food waste to food recovery organizations. Ontario, British Columbia, and Nova Scotia have initiated a Farmers Tax Credit for food donations, but there is no credit in place for retailers.

The National Zero Waste Council developed a campaign called "Love Food Hate Waste" to help reduce avoidable food waste in Canada. This campaign/initiative is currently partnering with other municipalities such as the City of Vancouver, the City of Toronto, the City of Victoria, Guelph-Wellington, as well as a government-corporation organization in Quebec called RECYC-QUEBEC, the province of British Columbia, and Metro Vancouver. This campaign encourages households to plan their meals, use all their products, and shows ways to keep food fresh longer, in addition to other recommendations and tips on how to reduce food waste. This campaign does not mention practices to redirect surplus food to recipient organizations (MacDonald, 2019).

According to the Vancouver Food Strategy report (2013), the city has a mid-term food waste management action to "Explore pilot food recovery programs and initiatives to channel surplus edible food to people". According to a telephone interview with the City of Vancouver Zero Waste Council, the municipality does not have a food reclamation policy. The informant described the Vancouver Organics Disposal Ban and explained they had not noticed a difference in edible food donations since the implementation of the ban in 2015 and they were not sure what the impact of the ban would eventually be over time. The ban might encourage food businesses to redirect inedible food onto charitable organizations to reduce their composting costs. The Vancouver city council has other plans that include policies and actions to help stimulate, support and allow Vancouver to become a zero-waste community.

In Alberta, both Calgary and Lethbridge have or are in the process of implementing source separation requirements for the ICI sector. This means that separate containers for garbage, recycling, and organics are required. Calgary's program is fully implemented and Lethbridge was scheduled to begin implementing its program in 2020. Calgary has an education-first model for compliance verification, which has resulted in a very low instance of issuing fines for non-compliance.

In Calgary, according to [Calgary's Food System Assessment and Action Plan](#), the Calgary Inter-Faith Food Bank is the main player in terms of food recovery practices, and most programs and initiatives are closely linked to the Food Bank Distribution System. Some community-led organizations work in food reclamation and food redirection and The City of Calgary has provided them with some funding, but these organizations are mainly and primarily funded

through grants. The city of Calgary is currently working to reduce food waste through food redirection, but so far they do not have a food redirection strategy or list of guidelines in place.

Edmonton has traditionally been a service provider for ICI sector waste, however with recent changes including the closure of their post-collection sorting facility, the City is in the process of re-evaluating the ICI waste services it provides.

The City of Regina does not yet have any ICI diversion policies or programs in place but is working on developing some.

The City of Toronto has implemented Community Reduce & Reuse Programs. One of these programs is called Urban Harvest and it is based on collecting excess vegetables and fruits from people's houses and redirecting them to organizations and food banks. The City's Long Term Waste Management Strategy (Waste Strategy) recommends developing a Food Waste Reduction Strategy. The document does not mention food recovery practices as one of the actions to reduce food waste.

According to an interview with The City of Guelph project coordinator of the Smart Cities initiative and her team, the city does not have a food reclamation policy; however, they support food security, food provision, and community-building such as an Open Food Network and Composting programs as part of their mandate. According to the coordinator, the Guelph municipal government is currently working on a food waste flow study (gaps in food waste).

Halifax was the first municipality in Canada to implement an organics program in response to a provincial ban on organics disposal in landfills that requires all businesses and organizations to separate their recyclable and organic waste by requiring separate containers with clear signage. However, this program focuses on composting and does not mention food recovery practices.

The City of Montreal plans to divert 85% of its residual waste from the landfills by 2030. To achieve this target, the City's executive committee member said that they "will prohibit large grocery chains, educational institutions, and hospitals from throwing away food they no longer think is fresh". The city also plans to encourage food services to donate surplus food to food banks and community institutions (CBC, 2019). These diversion measures are part of the city's new plan for waste management, which could include a fine for disposal of food if the rules are

not followed (CBC, 2019); although, Councillor Jean-François Parenteau said that the first goal is not to fine, but to change the mentality (Banerjee, 2019).

International Examples of Food Waste Reduction Initiatives

Multiple European countries including France, Germany, Greece, Italy, and Poland give tax and fiscal incentives for the donation of food as a goodwill gesture and to encourage donations. For example, in Italy, value-added tax (VAT) is not imposed on food that is donated. Similarly, in France and Spain, a proportion (35-50%) of the value of donated food can be deducted from the taxable revenue of the donor enterprise.

Below are some examples of regulations in other jurisdictions that support the diversion of food waste from the institutional, industrial and commercial sectors:

- New York City requires that certain food waste generators source separate their organic waste and either arrange for transportation to a processing facility or compost it on-site. New York State will require the donation of surplus food and diversion of organic waste for processing for certain food waste generators starting in 2022.
- Austin, Texas, requires all businesses that require a public health inspection for food safety to also submit a plan to the City for organics diversion. The plan submission process is online and separate from other City processes.
- Boulder, Colorado, requires businesses to have separate containers and collection services.
- Portland, Oregon's metropolitan area (Metro) has approved a plan to require certain businesses to separate and divert waste. It has gone into effect in 2020.
- Seattle, Washington, requires businesses to sort all food waste into a separate bin for collection and has banned the disposal of food waste in the garbage.
- The state of California requires businesses that generate a large amount of organic waste to source separate waste, compost it onsite or self-haul to a facility, sell or donate surplus food, or subscribe to a waste service that processes organic waste.

- The state of Connecticut requires food waste generators to source separate waste and divert it to an authorized organics processing facility.

Non-Governmental Organizations in Canada that Reclaim Food

Organizations such as [Food Banks Canada](#), [Food Banks of Quebec](#), and [Moisson Montréal](#) have established partnership programs with large grocers. These large retailers have developed systems and invested in refrigerated equipment to recover, store, and deliver surplus food that cannot be sold. Organizations such as [Second Harvest](#), [Feed Nova Scotia](#), and [Refresh Foods](#) operate redistribution systems to recover surplus foods from all stages of the food supply chain. [La Tablee des Chefs](#) operates a system that recovers and redistributes surplus food from the hotel, restaurant, and institutional sectors. Second Harvest developed an online platform called [FoodRescue.ca](#) to facilitate the delivery of surplus food donations across Ontario by connecting food supply businesses that generate surplus food with local social service organizations and charities that can make use of the donated food. Second Harvest and Food Banks Canada rescued a combined total of almost 10 million kilograms of food in 2018.

Community refrigerators are also used in some areas across Canada to collect surplus foods from citizens and households so they can be shared within communities. For example, [Sauve ta bouffe](#) maintains a directory of community refrigerators in Quebec.

Other organizations and companies have focused on utilizing surplus food to create added-value products that are then either donated or sold. For instance, The Greater Vancouver Food Bank (GVFB) launched [Goodly Foods](#), a social enterprise that uses surplus food to produce soups, stews, and sauces for distribution to GVFB members or sale to foodservice partners or the company, Loop, uses surplus fruit, vegetables and bread to create fresh juices, beer and dog treats (Environment and Climate Change Canada, 2018).

Increasingly, social enterprises are tackling food waste by using and distributing surplus foods in diverse ways. For inspiration on what can be achieved, we highlight examples that encourage collaboration amongst social enterprises, municipalities, and businesses in the fight to reduce

food waste. Below is a snapshot of examples from active social enterprises in food reclamation, including:

[Food Cloud](#) was founded in 2014. Using an app that connects businesses with surplus foods to charities that can distribute foods, Food Cloud offers a user-friendly platform to make food donation straightforward. Food Cloud has helped over 9,100 charitable groups get surplus food in Ireland and the UK, equivalent to 50 million meals that have gone to people and not to waste.

[Food Rescue App](#) was rolled out in 2019 to connect volunteers with food redirection routes, making it easier to make sure good food gets eaten and stays out of landfills. The app works with local restaurants, bakeries, grocers, and distributors in Calgary, Edmonton, and Winnipeg to ensure edible food is kept out of the landfill by redirecting it to service agencies and into the hands of people who can eat it. This process requires taking donations of large amounts of one food item (for example very ripe fruit, cheese, or milk that is nearing its best before date) that service agencies can't use quickly enough before the items spoil. Instead of letting this good food go to waste, they work with local chefs to repurpose ingredients into high-quality, marketable cuisine. The purpose of the Food Rescue App is three-fold: 1) Savings for service agencies to enable them to reduce their annual grocery bills and redirect vital funding into education, rehabilitation, and other programs which directly benefit the people they serve; 2) Helping the environment by diverting food from landfills and reducing the overall amount of food waste produced. 3) Savings for food donors who benefit from reduced expenditure associated with the disposal of excess food, reduced food storage costs, and the satisfaction of knowing they are making a valuable contribution to those in need.

[Loop](#), enables food wholesalers, retailers, and producers to divert one hundred percent of their unsaleable food away from landfill, and towards those in their community who can use it best.

[Re-Belle](#) takes fruits and vegetables that have been rejected by grocery stores. It saves the scraps and repurposes items into new products that are then sold.

[La Tablee des Chefs](#) in Québec, through its food recovery program, La Tablee des Chefs acts as a liaison between surplus food donors and local community organizations that will ensure the recovery of the food donated and its distribution to people in need.

Outcast, in Halifax, Nova Scotia, is a sustainable food tech company that makes beautiful food out of ugly produce. Outcast upcycles/ rescues imperfect produce by reforming it into a new, upcycled plant-based supply chain.

La Transformerie in Montreal reduces food waste by picking up unsold food items from participating grocery stores and greengrocers. It transforms some into fruit spreads that some merchants resell, while others are redistributed to local organizations.

Food rescue, Second Harvest is Canada's largest food rescue charity in Toronto with a dual mission of environmental protection and hunger relief. It redistributes nutritious, unsold food from across Canada to charities, non-profits and Indigenous communities in every province and territory. Their free, service helps nourish people through school programs, seniors' centres, shelters, food banks, and regional food hubs. In over 35 years, Second Harvest has rescued over 177 million pounds of healthy food, keeping it out of landfills and preventing 192 million pounds of greenhouse gases from entering our atmosphere.

Food Mesh, is a private business; operating in BC, provides apps, programs and services that help businesses and charities safely donate, claim donations, buy and sell products. Their services include a Web tool, that lists and allows the claim of specific donations available, listing and allowing the purchase of food sold at a steep discount, coordination of pick-ups 7 days/week and an app for tracking.

Loop, is a private business that started out in Dawson Creek, British Columbia, trying to reduce the operating cost of a family farm. It now works with grocery stores across BC, AB, and SK, diverting unsaleable grocery store food to animal feed, and to registered charities where possible. Services include transporting food waste from retailers, wholesalers & producers to charities and farms (focus on farms).

Copia, is a private business operating in Vancouver. Its technology allows businesses to safely donate their excess food, access enhanced tax deductions, and receive data to inform food purchasing decisions. Services include helping schedule delivery directly to non-profits, handling prepared food, recurring or on-demand deliveries, providing an App for the food recipient intake

process, an algorithm to match donations to non-profits, and scheduling delivery and tracking of donations.

[Leftovers](#), is a non-profit that works with local restaurants, bakeries, grocers, and distributors in Calgary, Edmonton, and Winnipeg to ensure edible food is kept out of the landfill by redirecting it to service agencies and into the hands of those who need it most. It redirects edible food with the help of a small but growing group of volunteers from vendor organizations, service agencies, and the community. In the spring of 2019, they rolled out a new app to connect volunteers with food redirection routes, making it easier to make sure good food gets eaten. Their services include matching food vendors (retail, restaurant, farmers' markets) to service agencies, coordinating volunteers to deliver primarily low-risk food directly from vendors (no meat/fish), providing an App for volunteer drivers to arrange deliveries and to track their impact. They also do education in schools.

To summarize, here are broad categories of food reclamation practices:

- Collecting surplus foods from citizens and households and sharing within communities through community fridge and pantries and other means (example [Sauve ta bouffe](#) in Quebec)
- Facilitating the delivery of surplus food donations by establishing an online platform to connect food supply businesses with social enterprise, local social service organizations and charities (example [FoodRescue.ca](#) and [Second Harvest](#))
- Using surplus food to produce soups, stews, sauces, beer, juices and dog treats for distribution and selling to foodservice partners or companies (example [the Greater Vancouver Food Bank](#) and [Loop](#))
- Using an app that connects businesses with surplus foods to charities to make food donation straightforward (example [Food Cloud](#))
- Working with local chefs to repurpose ingredients into high quality and marketable cuisine (example Upcycling method)

- Making beautiful food out of ugly produce by upcycling/ rescuing imperfect/misfit produce from ending up in a landfill (example [Outcast](#))
- Gleaning practices: Developing markets for products that would not have stayed in the food chain by purchasing food left in the field at a reduced rate and developing new food value chains
- Developing alternative markets for products rejected by retailers but still good to be consumed
- Feeding to livestock food not fit for human consumption: The best use of food surplus unfit for human consumption is to use it for animal feed
- Providing tax credits or deductions to support diversion of large volumes of food from the waste stream
- Encouraging the public to consume products that aren't cosmetically ideal but edible

Food Donation Brochure Intervention and Changes in Food Donation Practices

Student researchers contacted seven Saskatoon-based charitable organizations to request their participation in answering the question about changes in practices. Four organizations participated in the baseline interviews. The initial plan was for the brochure to be distributed to food businesses during food safety inspections. As a result of COVID 19 challenges, this process was not possible, and the brochure was ultimately mailed to food businesses. During the summer of 2021, endpoint interviews were conducted with the organizations that participated in the initial interview. Three organizations participated fully and a fourth was limited in their participation due to staff turnover and lack of capacity.

Recipient organizations reported a wide diversity of sources of donated food. All four organizations received food from grocery stores and large food retailers. There was significant variation in other sources with two of the organizations receiving very significant amounts of leftover food from hotels, banquet facilities, and restaurants. All organizations reported

receiving garden produce in the fall. One organization reported a very significant increase in food donations in the fall months (citing garden produce from individuals) while the other three did not notice much seasonal variation. One organization reported a very significant increase in donations due to the COVID-19 pandemic.

All organizations reported a combination of having food delivered and picking it up; however, they reported that there is not sufficient refrigerated truck capacity in Saskatoon for picking up all potential donations. Larger organizations reported using a refrigerated van or truck that facilitates pickup and contributes very significantly to their ability to respond to offers of donation. The amount of prepared food received by organizations varied and was reported as significantly reduced due to COVID.

The organization staff reported receiving a wide variety of perishable and non-perishable food items. The larger organizations reported having a policy in place regarding what types of food they accept. One organization referred to not being able to receive meat that was harvested in the wild. They reported variation in the percentage of food they receive that is usable, although two reported food received is at least 90% usable. One of the larger organizations credited their communications team with helping the public understand what types of food are most needed and that all donated food is expected to be in consumable condition. Composting donated food that is not usable was cited by one organization. Two organizations commented on their practice of contacting other food organizations in Saskatoon in cases when they receive more of a particular food type than they could use within expiry date limitations.

When asked if and how they kept track of donations, the respondents had varying responses ranging from weighing all food to not keeping track at all. One organization that receives large quantities of food reported that food comes in and out too quickly for tracking purposes and cited a lack of adequate infrastructure for weighing donations. Another organization reported weighing all food received. There was interest in building capacity to weigh or otherwise track food donations.

Two organizations stated that due to the intermittent nature of food donations they were satisfied with their current situation. One of the large organizations also indicated that the volume of food they received was adequate for their operations. Volunteer labour to receive and process food donations was cited as a factor for two of the organizations. Smaller organizations reported a reliance on volunteer labour as a factor that affects their capacity. Larger organizations reported that they had the capacity to absorb some increase in volume of food donations.

One organization specified the need to be careful regarding the kind of food they accept due to serving vulnerable populations with compromised immune systems. An interest in learning more about working with grocers and supply chain management was expressed by one organization. Three of the organizations reported a need for increased storage should the volume of donations increase.

Recipient organizations reported receiving donations from a wide diversity of sources at both baseline and endpoint. Corporate donations had increased significantly for two of the organizations but reported that changes may have been due to the pandemic rather than the project brochure being mailed out. One large organization offered the opinion that at the outset of the pandemic grocery stores experienced a reduction in movement of goods as people stayed home. This resulted in a higher level of donations (particularly perishable goods) from this sector. However, one of the large organizations indicated a belief that the food donation brochure was likely the catalyst for increasing food donations.

All organizations commented on the impact of COVID. The two larger organizations referred to national level efforts that resulted in increased corporate food donations. Second Harvest Canada was mentioned by three organizations as an important partner—particularly since COVID. The small organization reported being notified of available food through email communication from Second Harvest but not being able to access that food primarily due to lack of capacity.

Storage capacity was indicated as a factor by all organizations. Both large organizations have increased storage capacity in the last two years by obtaining donated or in-kind off-site

warehouse space. One of the organizations indicated that their storage is solely for dry goods while the other has obtained use of a freezer facility that allows them to accept and store up to 15,000 pounds of frozen food. The smaller organization highlighted storage as a main limiting factor in their ability to accept donated food.

Changes that were reported by all organizations since the beginning of the study period included increased inter-agency collaboration, but this was more likely due to increased collaboration over the course of the pandemic than a result of the intervention. Another related change was the larger organizations both indicated that their role acting as a sort of ‘food hub’ has increased significantly. They both do more redistribution to smaller agencies on a regular/weekly basis.

Staff emphasized the difficulty of determining the impact of COVID on food donations on their operations. Marked increases in donated produce/perishables were noted at the beginning of the pandemic by the two larger organizations that participated in both baseline and endpoint interviews. This increase was likely due to grocery stores experiencing a reduction in sales at the onset of the pandemic. At the same time organizations reported a decrease in the amount of prepared food that they received—again likely due to COVID and an overall reduction in events that result in leftover prepared foods.

While it is impossible to eliminate the impact of COVID on food donation practices during the study period, there were some relevant themes emphasized by participating community-based organizations (CBO).

- Storage capacity is a clear and common challenge. Larger organizations have arranged offsite storage and the smaller organization is hampered by their lack of storage capacity.
- While not universal, lack of volunteers/people to receive, sort and distribute donated food is a challenge and will be magnified should the volume of food donated increase.
- Perhaps the most significant finding is that all CBOs indicate a desire for increased inter-agency collaboration. The two larger organizations are currently providing a ‘food hub’ function by regularly receiving and redistributing food to other agencies. Smaller agencies report a desire for increased communication – indicating that knowing further

ahead what types and amounts of food will be available would be very helpful to their operations.

- Finally, larger organizations expressed an interest in developing a deeper understanding of how grocery stores and other food businesses operate (particularly in relation to food supply chains) and how CBOs could work more closely with them.

Food Service Industry Food Donation Challenges

A total of 15 Saskatoon businesses were contacted for interviews regarding food waste reduction and donation practices, and 9 participated in an interview. The interviews ranged from 6 to 12 minutes in length. Consent was received before each interview to record the calls for transcription purposes. Participants included owners, managers, assistant managers, executive chefs and food/beverage directors from local restaurants, grocery stores and hotel centres. Because of the COVID-19 pandemic, many of the business described fluctuations and changes to their donation practices, as well as with policy changes at recipient organizations. In order to reflect what was deemed as “normal practice”, the participants were asked to reflect on both pre- and during COVID-19 practices.

Out of the nine Saskatoon businesses that were interviewed, eight donated food. One business was donating food scraps to local pig farmers but is no longer doing so due to lack of demand. This business was willing to look at donating to an organization that would result in edible food waste being used for human consumption. The one business who was not donating food stated it was due to feeling there was not enough food to donate. There was a trend that restaurant and hotel centres had decreased donations since the COVID-19 pandemic due to decreased product output, cessation of buffets and no large group events/meetings for catering. Grocery stores were unaffected in terms of how much product they had to donate but did have to work around COVID-19 practices in terms of how donations were collected and picked up to reduce contact and exposures.

Tracking food donations in terms of weight, items or frequency of donations was not a common practice, with only 2 businesses tracking this data. In one case, the organization picking up the donations provided donation records every few months to the business. One business was able to track how much product was available for donation but did not actually log the amount that was picked up for donation. Most businesses felt the frequency and quantity of donations was up to their discretion and therefore did not track this data. Other than with the COVID-19 pandemic, there were no reported major times/patterns that causes noticeable fluctuations in donations in terms of holidays, seasons or days of week.

Items being donated included bakery and bread products that were pulled before optimal best before date, dry goods with a best before date, fresh meat that was then frozen, hot meals/restaurant items, over production from buffets/catering and damaged goods. Dairy, meat, and produce were not common donations. It was common practice for the food donations to be picked up by the organization accepting donations, with only one business delivering the donations.

Common barriers to donating edible food waste that were identified included COVID-19 regulations within organizations accepting donations, uncertainty with current regulations, confusion on who to donate to, the times that food donations are accepted, a need for a convenient program that picks up donations when requested, the feeling of not having enough food product that is worth donating, and concerns with liability. Businesses were also cognisant of reducing food waste for their own financial reasons. Four businesses had policies on food donations, whether it be formal or informal. These were set either by the business itself, or management companies and set the tone for what products were donated (i.e.: prepared food, dry goods, raw ingredients). This is a barrier that could be reduced by helping local businesses to create a policy tailored to their needs and capacity that would then streamline the donation process.

Qualities that businesses found to support the donation process were using consistent practices/systems, ensuring all employees are aware of the current practice/system, working with one organization and having windows of times that donations were accepted and picked up. The

overall attitude towards food waste reduction and donating edible food waste was positive and supportive. One participant felt strongly that businesses with large amounts to donate should be cognisant to spread their donations to various organizations to ensure one was not dominating this field. The “Donating Food in Saskatoon” pamphlet was emailed to eight participants who expressed interest in learning more and gave consent to receiving it.

Awareness of the upcoming ban on landfilling organic waste in Saskatoon was low with only two out of nine businesses actively aware of this bylaw. Two out of the nine of the businesses were already composting food waste that was not fit for donation and thus were confident that they were prepared for this bylaw. The “Recycling and Organics Regulation” fact sheet was emailed to participants to were interested in learning more about this bylaw and gave consent to receiving it.

The overall attitude to donating edible food by responding businesses was positive and supportive. Findings can be summarized as follows:

- Of the nine organizations that participated, eight donated food.
- The one organization not donating indicated a lack of food to donate.
- COVID resulted in an overall decrease in food donations.
- Grocery stores were relatively unaffected in terms of the amount of food available for donation but COVID impacted practices and made donating more difficult.
- Tracking food donations is not a common practice with only 2 businesses keeping track.

In terms of needed supports to increase edible food donations, businesses identified a need for consistent policies and practices and the benefit of working with one CBO. The “Donating Food in Saskatoon” pamphlet was cited as important in supporting businesses interest in learning more about how to donate.

CONCLUSIONS AND RECOMMENDATIONS FOR FOOD WASTE REDUCTION AND FOOD RECLAMATION

Food is the largest contributor to solid waste, causing provinces and municipalities concern over dwindling landfill space. While in the landfill, food waste also causes significant environmental harm through its methane emissions. The growing, processing, packaging, and transporting of food that will eventually end up in the landfill also wastes a significant amount of time, energy, money, water, and fossil fuels. Food waste is a drain on the environment, economy, and communities.

Harvard Food Law and Policy Clinic (2016) believes that governments' roles in food recovery are as follows:

- A- Providing funding for food recovery.** Governments can provide a variety of funds for food recovery programs and infrastructure. This funding can take the form of competitive grants or direct spending. Such funding can go towards supporting food recovery organizations, starting food waste prevention programs, building composting facilities, purchasing transportation equipment, shoring up the operating budget of local food banks, or a host of other projects to support increased food recovery.
- B- Offering grant programs.** Several governments at various levels administer grants aimed at reducing food waste. Eligible grant recipients compete to receive funding on the merits of their proposed use and applicability within the grant program goals. This will not only fund impactful programs and build new food recovery infrastructure; it also incentivizes nonprofits or private companies to develop innovative and effective mechanisms for increasing food recovery.
- C- Encouraging food waste reduction.** In addition to direct funding, provincial and local governments can encourage food waste diversion by organizing food waste challenges to inspire waste producers to reduce their amount of food waste. By challenging businesses to reduce their waste and quantify it publicly, governments can both promote the issue of food waste and reward those taking steps to reduce their waste. Governments can also encourage food waste reduction by passing a law or resolution to encourage food recovery.

D- Increasing public education. In addition to funding and encouraging food recovery, governments can provide educational information on food waste and food recovery. Most consumers are unaware of the amount of food being wasted. Provincial and local governments can disseminate information about food waste and donation by publishing on their websites, hosting educational seminars and conferences, providing training sessions, and running media campaigns. Potential food donors often have questions about aspects of food donation that can be easily explained online. Governments can provide answers on a wide range of topics, including food safety, liability protections, how to establish a food recovery program, and how to find potential food recovery partners.

Provincial and local governments can help keep food out of the landfill by incentivizing food waste reduction. They can provide financial support to organizations via competitive grants and direct appropriations. Food recovery program infrastructure, composting capacity, and anaerobic digestion facilities can be expensive. The costs of running food recovery programs, buying equipment, and building infrastructure often act as a barrier to food waste reduction.

Governments can also educate their citizens about reducing food waste. Key roles that governments could play in driving effective change include:

- Municipal governments should increase tipping fees to reflect the true cost of hauling waste away (e.g., from a long-term environmental perspective).
- Municipal or provincial governments should introduce legislation that prevents organic waste from going to landfill.
- Governments should separate the definition of food waste from an industrial versus household waste perspective to provide greater transparency about where loss occurs.
- Ministries of education should introduce school curricula to develop knowledge and skills (such as food planning, cooking with leftovers, and food preservation methods) that are important for encouraging the development of attitudes and behaviors that lead to reduced food waste.
- As food waste is linked with over-eating and the quality of food consumed, government and other bodies can influence portion size control and nutritional advice.
- Governments should improve communications around what "best before" and expiry dates mean in terms of food safety and nutritional value (Uzea et al., 2014).

Recommendations for Increasing Food Recovery for the City of Saskatoon

Immediate term (2022-2023)

- Use the findings from this study to integrate food recovery into the Industrial, Commercial and Institutional (ICI) organics regulation implementation that is planned between 2022 and 2024, including:
 - d. Ensure that food donation is compatible with bylaw enforcement procedures.
 - e. Highlight donation of edible food as a preferred option throughout education and programming and specifically address the barriers to edible food donation highlighted in this study.
 - f. Have a food donation directory embedded in the ICI “waste wizard” tool and work with community partners to ensure information remains current.
- Enhance community awareness of food waste through piloting the [*Love Food, Hate Waste*](#) campaign, integration of food waste reduction education and programing as part of the implementation of the curbside and multi-unit residential organics programs, and other City sustainability programs.
- Collaborate with the provincial government as it implements its *Solid Waste Management Strategy* and participate in engagement on options for reducing organic and food waste. Share the results of this study as part of that participation.
- Further develop and seek funding with community partners to:
 - c. Address the barriers identified in this study by organizations accepting food donations to further their capacity to accept recovered food.
 - d. Pilot a food recovery social enterprise that will improve local capacity to recover more edible food from the waste stream while creating employment opportunities.
- Include food reclamation and the results of this study in the development of the City’s *Circular Road Map*, which will be completed through *Circular Cities & Regions Initiative* in early 2022.
- Add additional questions in the ICI waste and recycling survey on food recovery to better understand the barriers to food donation.

Medium-term (2024-2025)

- Ensure food waste, including the findings from this study, are included in the *Sustainable Food Action Plan* planned for 2024-2025. Through this work assess the implications of providing municipal support, such as capital, operational or grant funding for food recovery compared to composting through a triple bottom line assessment.
- Assess food-recovery apps and consider procurement as part of the ICI organics regulation education and communications following additional engagement with both food waste generators and the food donation sector.
- Expand the City's annual environmental cash grant for community organizations to have a food waste reduction and recovery component at \$10,000 per year.
- Improve waste characterization studies and other data collection for the ICI sector to get a clearer picture of food waste in Saskatoon and the sectors that programs should target.
- Request funding to complete a material flow analysis of ICI food waste to better understand the current state of food donation in Saskatoon.
- As food-service contracts at City facilities expire, integrate food waste reduction and recovery of edible food into the tendering criteria. Integrate this outcome into the sustainable procurement work planned by the Sustainability Department.

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APPENDIX A

Recipient Organization Interview Guide (Baseline and Endpoint)

We are conducting a small intervention study on food donation practices to understand what happens when public health inspectors begin to hand out a pamphlet containing information on the rights and responsibilities of food businesses (restaurants, banquet halls, grocery stores, other food stores), as well as on where to donate and when. This pamphlet will also be accompanied by a letter from the City of Saskatoon encouraging donation and explaining why it is important to the City's environmental goals. We want to know if this small intervention changes food donation practices in the city and how. This is why we are interviewing recipient organizations now, before the implementation of the pamphlet and then again about 6 months later after the pamphlet has been handed out.

- 1) What is your position or role within your organization?
- 2) Can you tell us about how your organization typically receives food donations?
 - a. From what types of businesses? Examples include grocery stores, grocery store delis, specialty food stores, hotels, banquet facilities, restaurants and bakeries.
 - b. How do potential donors make their first contact?
 - c. How do you usually receive it? Is it dropped off or do you pick up or both?
 - d. Is there an increase in donations at different times of the year, month or week? For example, donations may increase during summer, or at the beginning of the month, or on Mondays.
 - e. What do you usually receive?
 - f. Do you have a policy on what type of food is accepted?
 - g. In terms of the food that you receive, what proportion of it is typically useable? And of the food that isn't useable, what is the usual reason for this and how do you dispose of this food?
 - h. Is the food usually prepared (like ready to serve foods) or basic ingredients (foods that will usually be transformed into something else) or both? Can you estimate what proportion is prepared and what is basic ingredients?
- 3) How do you keep track of what you receive?
 - a. Can you show us any logs or other documents you usually use to keep track of donations? We are not interested in names of organizations or individuals but rather in the information you collect on what you receive, when and what types of foods.
 - b. How do you measure or quantify the amount of food donated? Do you estimate the weight of donated food? Or keep track of approximate quantities? We would like to see these so that we can have a better idea of what you receive to see if we can quantify or otherwise keep track of that information so that if after the pamphlet goes out we can see if there are changes to what you receive and how much.
- 4) What is currently working about food donation to your organization and what would you like to see change in terms of food donations?
- 5) How much capacity does your organization have should the volume of donations increase significantly (say if there was a ban on landfilling organic waste in Saskatoon or the provincial government developed new food waste reduction programs)? Would you like to see the amount of food donated to your organization increase?
 - a. Follow-up question: Have you experienced a time where donations have exceeded your organization's capacity? If so, how did you proceed?

- 6) What kinds of support would your organization need should the volume of donations increase significantly?
- 7) Is there anything else you would like to tell us about food donation and your organization?




APPENDIX B

Interview Questions for Food Businesses

1. What is your position or role within your business?
2. Please tell me if and how your organization donates food.
 - a. Do you have a policy on what types of food you donate?
 - b. What do you usually donate?
 - c. Is the food usually prepared (like ready to serve foods) or basic ingredients (foods that will usually be transformed into something else) or both? Can you estimate what proportion is prepared and what are basic ingredients?
 - d. Do you drop it off or does it get picked up or both?
3. Do you have more donations at certain times of the year, month or week?
4. How do you keep track of what you donate?
 - a. Can you show us any logs or other documents you usually use to keep track of donations? We are not interested in names of organizations or individuals but rather in the information you collect on what you donate, when and what types of foods.
 - b. How do you measure or quantify the amount of food donated? Or keep track of approximate quantities?
5. What is currently working about your food donation practices and what would you like to see change in terms of food donations? a. What specific barriers do you currently have to donating edible food? 38
6. It seems likely that policy changes are coming at both the provincial and municipal government levels when it comes to organics. If there was a ban on landfilling organic waste in Saskatoon and/or the provincial government developed new food waste reduction programs how do you think your organization would respond?
 - a. What kinds of support would your organization need to increase the volume of donations you make rather than send edible food to the landfill or for composting?
7. Is there anything else you would like to tell us about food donation and your organization?

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