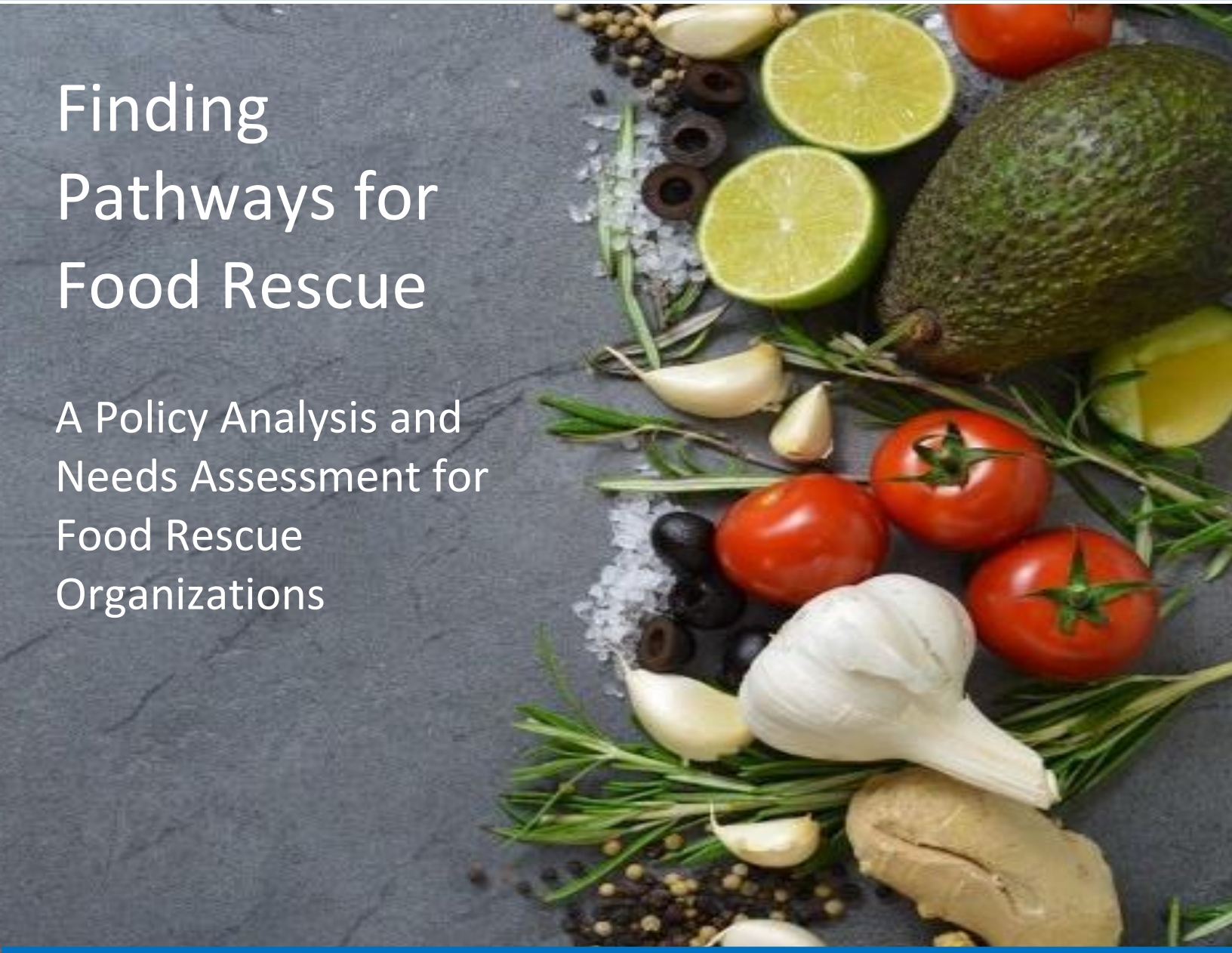
Finding Pathways for Food Rescue – Full Report
Cornell Institute for Public Affairs

Finding Pathways for Food Rescue

A Policy Analysis and Needs Assessment for Food Rescue Organizations



By Tiffany Agard and John Tanis | Faculty Supervisor Laurie Miller

HOLE FOOD RESCUE
JACKSON HOLE, WY

WALKING SOFTER

By Tiffany Agard and John Tanis
Cornell Institute for Public Affairs
With Faculty Supervisors Laurie Miller
In Consultation with Walking Softer

Acknowledgments

We would like to extend our deepest gratitude to Walking Softer for supporting this research. We are grateful for your dedication to this space and desire to make a difference. We also thank Sustainable America and the Food Rescue Alliance for their guidance and continued support of our work. Your data and deep knowledge of food rescue made our research possible. We also thank Feeding America for their support in our data collection. Many thanks are in order to our advisors – Ali Dunford-Milburn, Derek and Laura Cabrera, and Laurie Miller – for their direction and encouragement in shaping this research. We also extend a strong and gracious thank you to Dr. Doug Miller for his advising and guidance on our statistical analysis. Lastly, we extend our deepest gratitude and respect to those who are working in the food rescue space. Your work has a profound impact on communities and the environment every day. Our work would be insignificant without your continued efforts in the field.

WALKING SOFTER

Walking Softer envisions a planet with a restored relationship between humanity and nature, where all biodiversity thrives. Their mission is to build a collective of advocates who inspire personal responsibility and stewardship for our planet. To enact its mission, Walking Softer invests in solutions that soften the impact of humans on the planet.

HOLE FOOD RESCUE
JACKSON HOLE, WY

Founded in 2013, Hole Food Rescue is a nonprofit based in Jackson, WY with the mission to reduce food waste and food insecurity. They rescue imperfect, expiring, and surplus food from local retailers 365 days a year and distribute it back into the community. With the help of volunteers, they rescue an average 657 pounds of food from entering the landfill every day.

Table of Contents

List of Abbreviations

Abbreviation	Explanation
BFR	Boulder Food Rescue
CNP	Childhood Nutrition Program
EPA	Environmental Protection Agency
ERS	USDA's Economic Research Service
FDA	Food and Drug Administration
FLPC	Harvard Law Food and Policy Clinic
FMI	Food Industry Association
FMLFPP	Farmers Market and Local Food Promotion Program
FNS	USDA Food and Nutrition Service Waivers
FRA	Food Rescue Alliance
FRO	Food Rescue Organization
FRN	Food Recovery Network
FWRA	Food Waste Reduction Alliance
GMA	Grocery Manufacturers Association
LAMP	Local Agriculture Marketing Program
LFPP	Local Food Promotion Program
NRA	National Restaurant Association
NRDC	National Resource Defense Council
PATH	Protecting Americans from Tax Hikes Act of 2015
REFED	Rethink Food Waste through Economics and Data
SA	Sustainable America
SNAP	Supplemental Nutrition Assistance Program
TEFAP	The Emergency Food Assistance Program
USDA	United States Department of Agriculture
VAPG	Value-Added Producer Grant Program
WIC	Special Supplemental Nutrition Program for Women, Infants, and Children

Executive Summary

Food rescue connects excess food to hungry people. The concept is age-old, simple, and effective. However, opportunities exist to better understand which policies scale food rescue and meet the expressed needs of food rescue organizations (FROs). This report explores the policies thought to support FROs in the United States and assesses primary FRO needs. To do so, a sweeping needs assessment survey was conducted alongside major FRO networks. Then, the policies known to support FROs were tested through geospatial and regression analysis. Importantly, this report finds statistical evidence that certain liability protections and tax incentive legislation on the state and federal level may support the growth of FROs. This report concludes by illustrating four data-driven pathways (policy, technology, partnerships, and education) for food rescue advocates seeking to support, expand, or empower FROs.

Key Takeaways from Food Rescue Survey and Geo-Spatial Policy Analysis

The Cornell research team contributed two analyses to current food rescue research. The survey component was designed and distributed in partnership with Sustainable America and Food Rescue Alliance. The national survey assessed the needs of 56 FROs, ninety-four percent of which reported an increase in demand for their services due to COVID-19. The statistical and geospatial analysis component was completed in partnership with Cornell faculty statisticians and GIS technicians.

1. **Food Rescue Models:** There are three basic models of organizations that conduct food rescue– food pantries, FROs, and food systems organizations. The differentiating factor is a mission. There are sub-models FROs, differentiated by factors like the number of employees, ownership of capital, and food rescue system (i.e., acting as coordinator between grocers and nonprofits versus conducting food pickups directly).
2. **Food Rescue Barriers:** Challenges for food rescue span both the food donors and FROs which redistribute their food. Challenges of FROs include limited cold storage, funding, transportation, liability concerns, and the resources which food donors must dedicate to organize food donation.
3. **Potential Solutions:** Primarily, over 80% of FROs agree that their impact could be increased by the creation of media resources to meet common FRO knowledge gaps identified in the survey. The survey proposed media resources including videos, podcasts, interactive web tools, or other media content explaining the topics of food rescue basics, food safety requirements, liability protections, and tax reporting. Collaboration with government agencies or networks of FROs has the potential to create and distribute these educational resources. Additionally, FROs could leverage a shortlist policy recommendations to increase policy advocacy for laws found to support food rescue. Finally, increasing access to the most beneficial technologies for food rescue could allow food rescue efforts to scale more quickly.
4. **Policy Analysis:** The geospatial analysis uncovered a positive relationship between FROs and policies known to support food donation. Foremost, 69% of FROs exist in states with expanded liability protections, tax incentives, or both. This fortifies the case for state and federal legislation which expands protections and incentives for food donors and FROs.

Opportunities to Translate Findings into Action

These data-driven takeaways empower the client with the knowledge necessary to lay a better foundation for food rescue. Specifically, the following steps could be enacted. See the "Recommendations" section for more detail on next steps to support food rescue.

1. **Policy**: First, increase political support for legislation found to support food rescue. Second, support the development of a policy recommendations resource that could be brought by

food rescue advocates to their local and state representatives. Empowered by policy knowledge, advocates can increase pressure on representatives through website forms, letters, emails, social media posts, phone calls, town hall discussions, individual meetings with policymakers or attendance at committee hearings or floor sessions.

2. **Partnership Development:** FROs can seek partnerships with government organizations or industry partnerships to meet FRO needs, including transportation, storage, funding, and educational resources about food donation.
3. **Education:** Media resource creation in the form of videos, podcasts, interactive web tools, or other media content can promote self-guided learning for FROs. This media content should be simple, interactive, and based on the education needs expressed by FROs in this research. Surveys found that the following information areas were most often requested: liability protections, tax incentives, tax reporting processes, government funding sources for FROs, FRO technology options, food safety, and food date labeling.
4. **Technology:** Support technology applications that facilitate food rescue, by reducing common barriers such as transportation constraints and/or volunteer coordination. Fee-for-service models can help these technologies scale, and finding a consistent, reliable transportation source through contracted drivers, staff, or volunteers is imperative.

Introduction

Rescuing food matters. When food goes uneaten, the land, labor, and energy used to produce and transport that food is wasted. The Environmental Protection Agency estimates that food wasted or lost in the United States costs an estimated $218 billion, or 1.3% of GDP annually.[i] Legislative tools are evolving to curb this this waste. This research report explores the vital role of public policy in reducing food waste.

As food rescue continues to grow across the country, research must provide pathways for food rescue to move forward. Walking Softer partnered with the Cornell team to find ways to find such pathways. This report serves as a roadmap for Walking Softer or other advocates seeking to support FROs.

The following questions were the cornerstone of the research. These were crafted to fill information gaps and increase the validity of findings within the current body of food rescue research.

1. What are the major needs of FROs?
2. Which public policies support FROs in the U.S.?
3. In which kinds of communities do FROs tend to exist (income level, population, demographics)?
4. Which software applications and technology have been most successful in supporting food rescue in the U.S.?

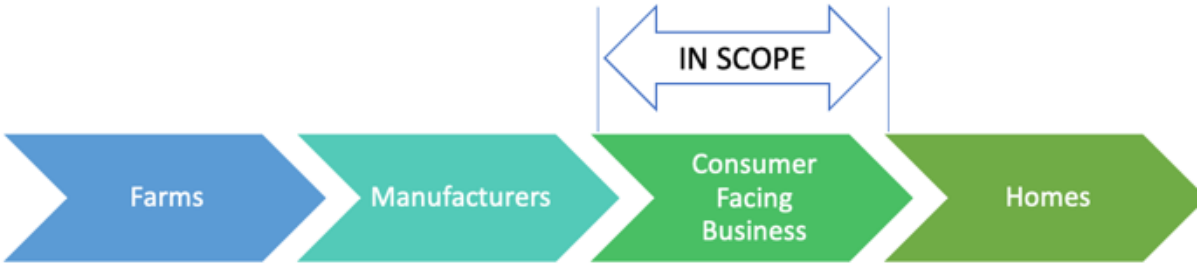
Food Rescue Overview

FROs are organizations working at the local level to fight both food insecurity and food waste. Over 90% of the organizations surveyed were 501(c)(3) nonprofit organizations. Any organizations conducting food rescue are referred to as FROs in this report.

FROs counteract both food waste and food insecurity, making them a quintessential tool for public administrators seeking to damper the effect of a global pandemic. Food waste seems more tragic in light of the COVID-19 crisis, which has driven a sustained increase in the unemployment rate, food assistance program registrations, and food insecurity.[ii] No group bears the impact of the pandemic more than the low-income folks who FROs serve. According to the Federal Reserve Bank, 39% of employed people having a household income less than $40,000 reported a job loss in March of 2020 alone. Lines at food banks grow longer, first time unemployment claims spike, and food insecurity grows.

Cornell Research Scope – Retail Stage of Food Supply Chain

This research report focuses on policy and organizations which exist at the retail stage of the food supply chain. The reason is twofold. Primarily, the retail stage is where most FROs primarily operate. Secondly, ReFED finds that 40% of total food waste ($16B tons annually) occurs at the retail stage where most FROs operate.[iii] Other stages are referenced in this report, but they are not the focus.



Urgent Need for Food Waste Reduction Efforts

To be clear, all food cannot be rescued. Nor should it be. Figure 2 shows the Environmental Protection Agency's (EPA) advice for the disposal of food unfit for human consumption. Many responses from this project's survey expressed that sorting out inedible donated food is a major challenge for FROs. About 80% of food waste comes from perishable foods. This includes deli foods, meats, vegetables, fruits, meats, dairy items, as well as bread and other grain-based foods.[iv] As such, the foods rescued by FROs are prone to spoilage. This creates a challenge for FROs, which may lack resources to divert spoiled produce to the EPA preferred waste streams (i.e. diverting large quantities of food to compost). Note that non-perishable food items like canned beans and fruits are rescued less often, as they are generally shelf stable for extended periods of time.

Figure 1: EPA Food Recovery Hierarchy[1]

Forecasters predict further consolidation of restaurants and food services as COVID-19 progresses. Cornell economists estimate U.S. consumers spent about 50% of their food income at grocery stores before the COVID-19 pandemic. During the pandemic, consumers spent almost 80-90% of their food income at grocers[v]. Kroger, for example, has seen both a 30% sales jump and increase in dollars per sale.[vi] As consumers spend more at grocers, retail food business consolidates. As retail food business consolidates, so too does food waste. As grocers become the focal point of retail food waste, food waste interventions at that stage become more vital. In food waste research, the spotlight is often on FROs. Not only is it scalable, but it also works best when the food supply is consolidated to major grocers. Now seems an opportune time to fund, empower, and expand FROs.

Three Basic Types of Organizations Conduct Food Rescue

The Cornell research team identified three basic types of organizations which rescue food. These are food pantries, FROs, and food systems organizations. The nuances between models will be discussed later in the report.

1. **Food Banks & Food Pantries** might conduct food rescue, but their primary mission is hunger relief. Food pantry survey respondents report rescuing more shelf stable foods than did FROs and food systems organizations.
2. **Food Rescue Organizations** conduct food rescue as their primary mission in order to reduce both food insecurity and food waste. In other words, these organizations care about the 8% of total GHG caused by food waste, as well as the 50 million Americans projected to experience food insecurity in 2020.[vii]
3. **Food Systems Organizations** conduct food rescue as part of their mission, which may also encompass other elements of the local food system. For example, these organizations may offer community programs which affect change where food intersects race, gender, ability, socioeconomic status, labor, agricultural sustainability, and more.

The survey conducted responses overwhelmingly from FROs. Within the umbrella of FROs exists a subset of organizational models. Differences within that subset include factors like number of full-time employees, number of pounds rescued, and use of a physical location for processing food donations, among others.

Federal, State, and Local Policies Expand Food Rescue

There are both existing and proposed policies which appear to encourage food rescue. These span federal, state, and local levels. They consist of legislative measures which create liability protections, tax incentives, date labeling standards, grants, and food waste penalties. Most notably, the Bill Emerson Food Donation Act of 1996 creates the federal floor for liability protections and the PATH Act of 2015 creates enhanced tax incentives for food donors. A 2018 report from ReFED recommends that knowledge of federal liability protection and tax incentives are low, and a push for education for food donors could greatly increase the overall amount of food donated in the United States.[viii]

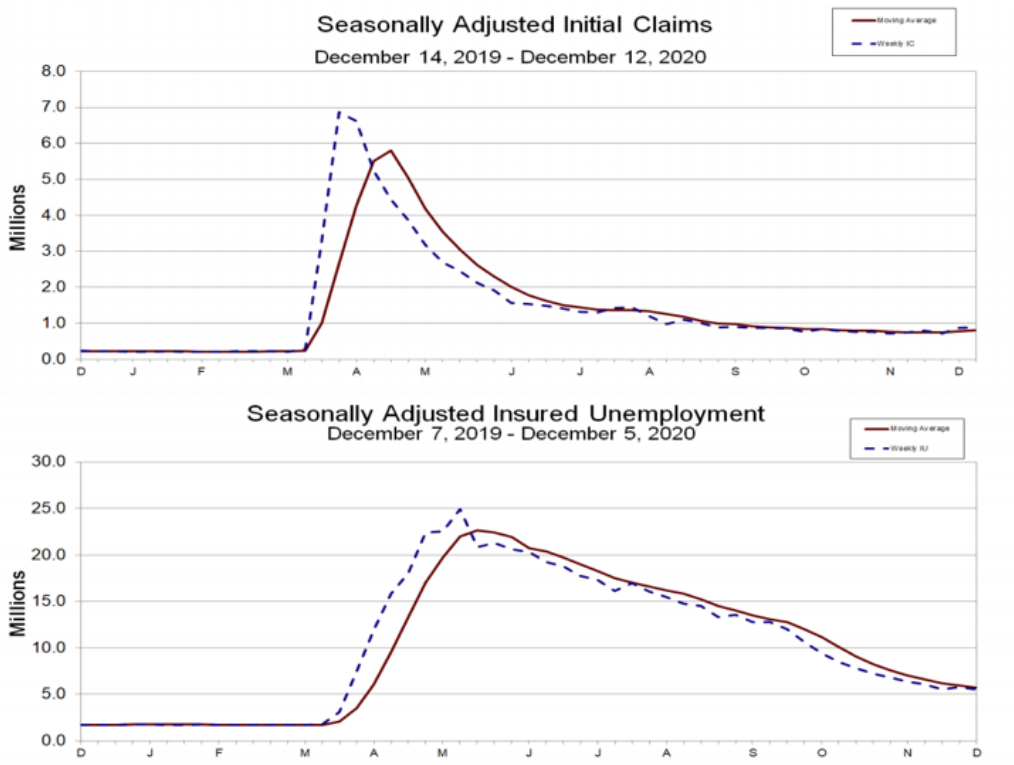
Literature Review

Note that research referenced and discussed in this literature review was compiled into an annotated bibliography by Cornell researchers. Click here for access. Along with a link to the resource, the bibliography includes author, year, title, and organization, and a description of the contents found at each link.

Unemployment, Food Insecurity, and Food Waste During COVID-19

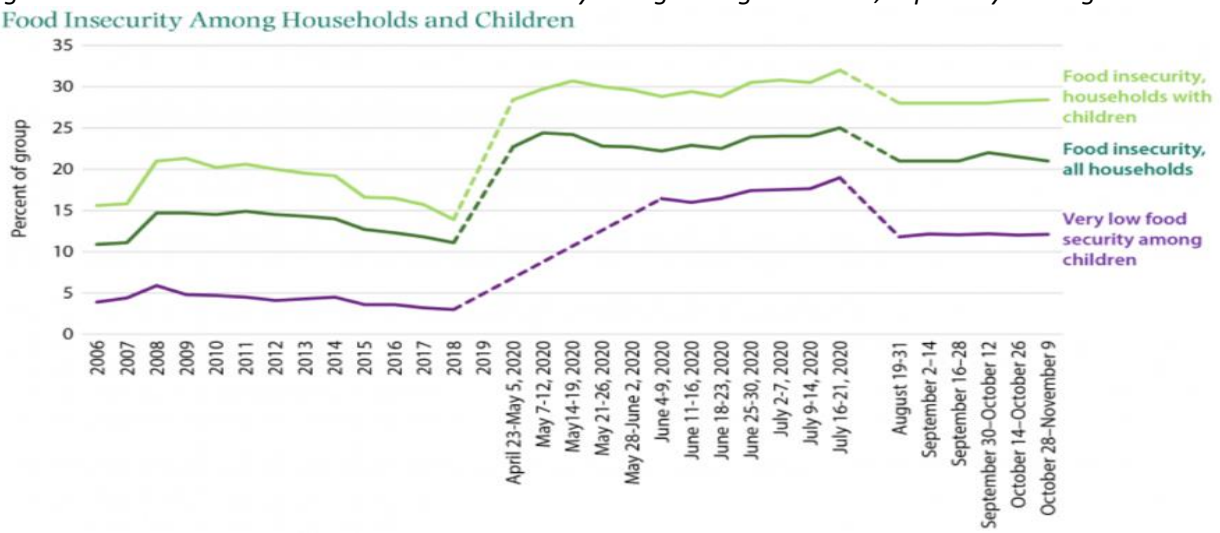
Food waste and food insecurity coexist amid historic spikes in unemployment claims, food assistance programs, and demand for food banks and pantries. In the second week of December 2020, 885,000 Americans made their first-time claims for jobless benefits. The Federal Reserve Chair Jerome Powell signals that this trend will likely continue throughout Winter 2020, despite the COVID-19 vaccine rollout.[ix] Finally, jobless claims remain above their levels during the 2007-2009 Great Recession, but they have dropped from a record 6.87 million in March of 2020.[x]

Figure 2: Initial Jobless Claims Spike and Remain Elevated during COVID-19



Concurrent with the climb in unemployment, food insecurity has been on the rise, especially for children. The first five years of life are known to be foundational and instrumental years for mental and physical development. Sadly, 2020 has seen spikes in food insecurity. Feeding America now projects the number of food insecure folks in the U.S. to rise to 50 million, including about 17 million children. At the end of 2020, the percentage of food insecure people in this country remained higher than it ever was during the economic recession in 2007-2009.[xi]

Figure 3: U.S. Census Bureau Shows Food Insecurity Rising during COVID-19, Especially Among Children[xii]



Source: U.S. Census Bureau (Household Pulse Survey) 2020

Food Waste

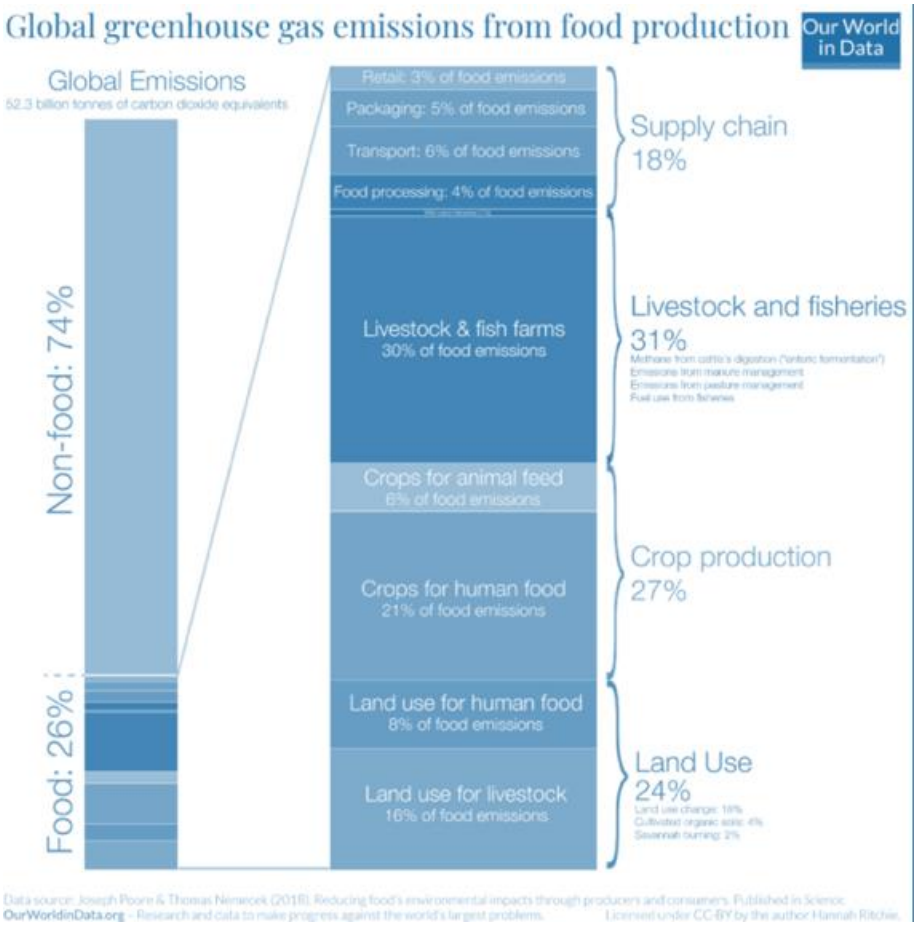
In a 2017 research paper entitled *Wasted*, the National Resource Defense Council (NRDC) produced an appendix aggregating estimates for food waste in the US.[xiii] Since 2010, groups including ReFED, the EPA, National Institute of Health (NIH), United Nations Food and Agriculture Organization (FAO), United States Department of Agriculture (USDA), and widely known food waste author Jonathon Bloom have chimed in with food waste estimates. Estimates project that between 15-40 % of food produced for the United States goes uneaten. To visualize all that food, Bloom, author of *American Wasteland*, reports that the amount of food wasted in the United States is, "enough to fill the 90,000 seat Rose Bowl stadium (in Pasadena, California) each day[xiv]OBJ

Figure 4: U.S. Food Waste Enough To Fill Rose Bowl Stadium Daily

Shipping all this food to landfills contributes greatly to greenhouse gas emissions. According to the FAO, global food loss and waste generate annually 4.4 Gt CO2 eq, or about 8% of total anthropogenic (human caused) GHG emissions.[xv]

Landfills are not the only place food produces greenhouse gas emissions. Emissions happen at many points within the food production system, which produces a quarter of the world's greenhouse gasses. A meta-analysis of current literature on food waste and emissions by Thomas Nemecek and Joseph Poore (2018) breaks down food's total share of emissions by source.

Figure 5: Emissions of Food Productions[1]



Food Waste Interventions Spanning Food Supply Chain

Food waste reduction efforts span the food supply chain. Food rescue is the practice of intercepting food which would be otherwise wasted and redirecting it for human consumption. It is one of several actions through which food waste reduction is achieved. Below, other waste reduction efforts are briefly outlined by stage of the food supply chain.

Farm or Production: 16% of food waste happens on farms. A 2019 study from Santa Clara University finds that, on average, over 31% of edible produce of a farm's yield remained in fields after harvest.[xvi] At this stage, low market prices, lack of demand, lack of labor supply, high labor costs, and often strict cosmetic standards for produce all contribute to food going to waste at this stage.[xvii] Gleaning networks such as the Boston Area Gleaners are traditionally the only groups rescuing food from this stage of the value chain. Produce delivery box services offered by businesses like Imperfect Foods, Misfit Market, or Perfectly Imperfect Produce are creating markets for "ugly" or "blemished" foods through low prices and the growing base of sustainability-minded consumers. ReFED identifies the Imperfect Produce business model as pivotal in the reduction of food waste.[xviii] Their research estimates that the

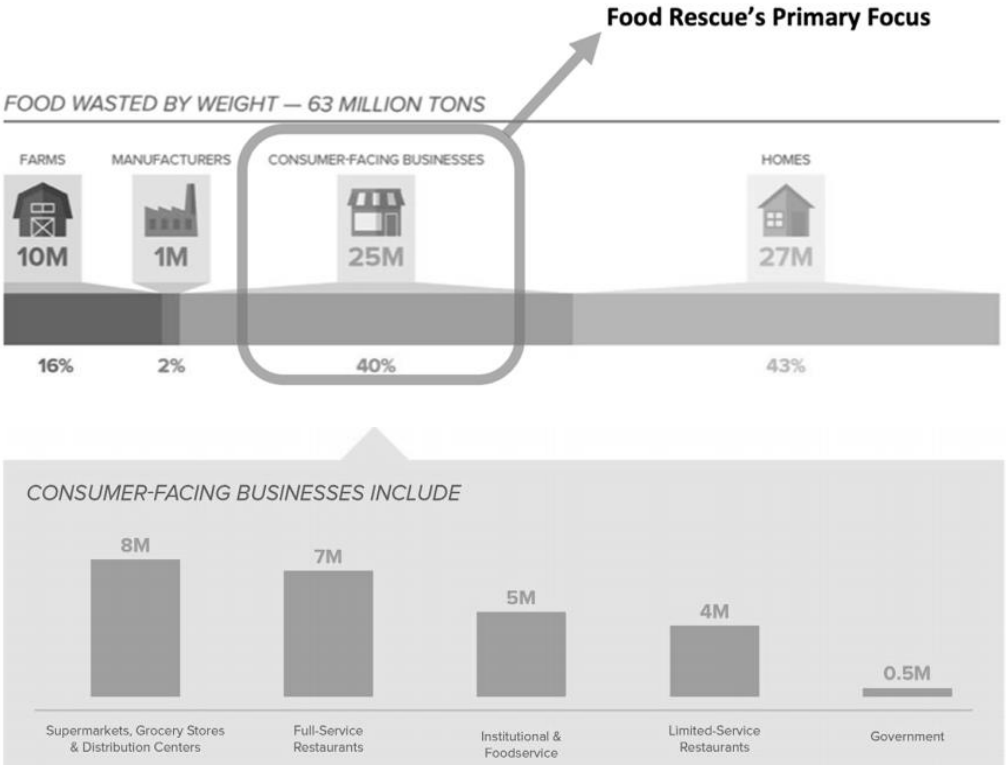
development of secondary markets for imperfect foods could reduce 10 million pounds in unharvested food loss annually.[xix]

Manufacturers: 2% of food waste happens in processing facilities. Here, foods like carrots and potatoes are often trimmed, generating edible scraps that go to waste. Upcycling is becoming a common intervention here. Per the Upcycled Food Association (UFA), upcycled foods, "use ingredients that otherwise would not have gone to human consumption, are procured and produced using verifiable supply chains, and have a positive impact on the environment." The movement to upcycle foods continues to grow.2020 data from Forbes valuated this industry at 46.7 billion in 2019, the same year UFA was founded.[xx] Association members are not limited to startups but include giants in processing and manufacturing. Both Dole and Cargill are members offering an upcycled product.

Consumer-Facing Businesses: 40% of food waste occurred in consumer-facing businesses, such as grocery stores, prior to COVID-19.[xxi] Grocers comprise the majority of organizations in consumer-facing businesses. Consumers in the U.S. seem to exhibit a preference for abundance on the shelves. As such, food that appears to be past prime is disposed of. Grocers respond to consumer preference by perpetually overstocking. Food rescue remains a scalable intervention to combat the perpetual growth of food production, and the food waste this growth creates.

Homes: This is where 43% of food waste happens. Up to 55% of food purchased are unplanned, leading to spoilage and over-purchasing.[xxii] Unlike grocers, homes are an unconsolidated entry point for rescuable food. This makes food rescue and other interventions quite difficult in this realm. Better food labeling policy and composting programs aimed towards consumers can help capture this food for non-human consumption.

Figure 6: Food Rescue Focuses on Consumer Facing Business Stage of Food Supply Chain



The Role of Food Recovery in Meeting Increased Food Insecurity

ReFED estimates that it would be possible to recover triple the amount of food being diverted from waste streams today through advances in policy, innovation, and education. ReFED also identifies the retail stage as having the highest potential for intervention. ReFED sees retail as an opportunity due to its need to perpetually overstock to attract consumers. This means, barring major cultural shifts, these retailers could form a backbone of food donors for FROs indefinitely. In turn, FROs can serve as a permanent safety net for these retailers. The PATH Act provides tax incentives for retailers, who can claim a tax deduction in the amount of the food's value. Generally, this cost is lower than market price, but on par with the cost to the retailer.

There is one metanalysis which took a systemic perspective of food rescue research. The 2019 report from Johns Hopkins Bloomberg School of Public Health reviewed 19 evaluations of FROs. Only two were domestic, signaling the condition of knowledge on U.S. FROs remains nascent. The report described food rescue as a "critical opportunity to improve food security and reduce waste…but better insight is needed to assess and compare the effectiveness of different food rescue." The authors found that FROs tend to rescue large quantities of food and have positive returns on investment and high stakeholder satisfaction. Furthermore, Johns Hopkins' analysis found that client health and food security measures were omitted from studies about food rescue. Finally, the report found, "a need for a consistent set of metrics for evaluating food rescue interventions."[xxiii] Report recommendations included the standardization of protocols for reporting, use of consistent metrics for human health and environmental impact, food consumption outcomes (is the food ultimately consumed or not), and need for further quantitative and qualitative assessment of food rescue needs.

In short, FROs are becoming more researched, connected, and complex every day. A handful of networks and actors in the food rescue space are necessary pieces to understanding the major players in the food rescue space. These players include networks of organizations, individual organizations conducting food rescue, and research organizations.

Networks Support the Expansion of Food Rescue

Networks will play a pivotal in connecting the growing number of organizations conducting food rescue in the United States. Feeding America, Food Rescue Alliance (FRA), Food Waste Reduction Alliance (FWRA), and the Food Recovery Network (FRN) are all networks which relate to food rescue in some capacity.

Notable Networks Supporting Food Rescue	
FEEDING AMERICA	**Feeding America** is a 501(c)(3) organization with the mission of feeding "America's hungry through a nationwide network of member food banks and engage our country in the fight to end hunger." The network consists of over 200 food banks and 60,000 food pantries. The network receives both acclaim and criticism for its exclusivity agreements (contracts) with national grocers and distributors including Kroger, Walmart, Safeway, Nestle, and others. These contracts allow member food banks and pantries to receive donations in a safe and standardized way, but also may impede the reception of food donations for FRO who remain unaffiliated with Feeding America's network of food banks. Surveys distributed by Cornell researchers identified common frustrations of FROs. Frustrations relate to communication, reporting requirements, and food safety standards, and are detailed in the findings section. With 300+ employees and a total revenue of over 2.8 billion, Feeding America is the nation's second largest charity. The organization, along with "partners" reports rescuing $3.6 billion pounds of food. All contributions from food rescue, food pantry, and food bank partners are included in this tally.
FOOD RESCUE ALLIANCE	**Food Rescue Alliance (FRA)** is a growing network of 30 member food rescue initiatives working toward a more just and less wasteful food system. Organizations are diverse in programs, employee size, budget, and food rescue capacity. All rescue food. The network prioritizes efforts to increase peer learning, resource-sharing, and experimentation. FRA appears to be the only formal network of nonprofit organizations conducting food rescue. Most members identify as food rescue organizations. Others identify as food pantries or food system organizations. FRA reports that by joining, members average a budget growth of 15 times original, and rescue 4 times the amount of food. The organizations operates as a nonprofit consultancy billing service and membership fees on sliding scale. No members are turned away. Food rescue alliance was previously a program of Boulder Food Rescue (BFR), and branched off recently. With 11 employees and a total revenue of $2.4 million, BFR is a fairly large FRO rescuing over 555,702 pounds of food per year. Annually, FRA member organizations rescue on average 24,500,000 pounds of food.
FOOD RECOVERY NETWORK FIGHTING WASTE. FEEDING PEOPLE.	Food Recovery Network (FRN) leads the push to increase food donation on college and university campuses. FRN is a national nonprofit which, "unites students at colleges and universities to fight food waste and hunger by recovering perishable food that would otherwise go to. The stated goal is to shift the norm on campuses from food waste to food recovery in the United States. The expansive network has 230 chapters since inception in 2011, and reports both rescuing over 3.9 million pounds of food. The network conducts summits with chapters in order to increase resource sharing, peer learning, and awareness of FRN resources. Specifically, chapter resources include phone call service for partnership development, volunteer management, leadership design, food donor cultivation, operational metrics, food rescue advocacy and education, and Branding, and more. The nonprofit reports 12 employees, 8,600+ volunteers, and $466,000 in revenue as of 2018.
SUSTAINABLE — AMERICA —	Sustainable America (SA) leverages design and marketing solutions to make the nation's food and fuel systems more efficient and resilient. Founded in 2012, this small 501(c)(3) nonprofit creates cutting-edge resources which educate the public. They contribute a crucial tool to the food rescue space – an interactive locator which consumers or businesses can use to find organizations conducting food rescue near them. This small organization is a philanthropic arm of design firm, Ocupop.

FOOD WASTE REDUCTION ALLIANCE	Food Waste Reduction Alliance (FWRA) is the only notable joint industry network and approaches food waste from the business perspective. Formed in 2011, the FWRA was cofounded by the Grocery Manufacturers Association (GMA), Food Marketing Institute (FMI), and National Restaurant Association (NRA). FWRA's three primary objectives are (1) reduce the amount of food waste generated, (2) increase amount of safe, nutritious food donated to those in need, and (3) recycle unavoidable food waste from landfills. The organization produces publications which gather resources for players in the retail food business. Resources categories include best practices to keep food out of landfills, solutions to donation barriers, diversion beyond donation, and reducing food waste generation.

Networks and Opportunities for Collaboration

Food rescue exists at the intersection of food business and the nonprofit sector. Physically, food rescue happens on the loading dock of a grocer. Staff from large grocery stores help load food into a volunteer's station wagon or truck. It seems intuitive that in conversations to overcome barriers to food rescue, both business and the leaders from the food rescue space ought to collaborate. Such collaboration appears be to be in early stages. This could be due to the fact that the networks connecting FROs (FRA, FRN, and SA) seem to be relatively new. The food rescue space could certainly benefit from increased collaboration between the nonprofit networks and business in the food rescue space. For example, FWRA has a stated goal of increasing donations of edible food and recognize liability as a challenge to doing so. Both Feeding America and FRA share this goal and recognize the same concern. This seems like a strong opportunity for collaboration. The development of donation liability education resources alone was valued at $159 million by ReFED in 2019. Given the projected economic value of donation liability education, networks could share input during the development of education resources, including video or other digital media resources explaining liability protections for business.

Figure 7: Resources Explaining Donation Liability Protection Valued at $159M[xxiv]

Other Education Opportunities

Several educational and research institutions contribute to this space through publishing material and creating resources for FRO. Contributions range from food rescue program analysis to policy analysis of legislation concerning donations, liabilities, food date labeling, and organic waste bans. Institutions include the John Hopkins Center for a Livable Future, Harvard Law School Food Law and Policy Clinic (FLPC), the University of Arkansas School of Law, the Natural Resources Defense Council (NRDC), and ReFED. Other food rescue tools have been added by government and nonprofit organizations like Sustainable America, Boulder Food Rescue, Colorado Food Systems Advisory Council, and the Environmental Protection Agency (EPA).

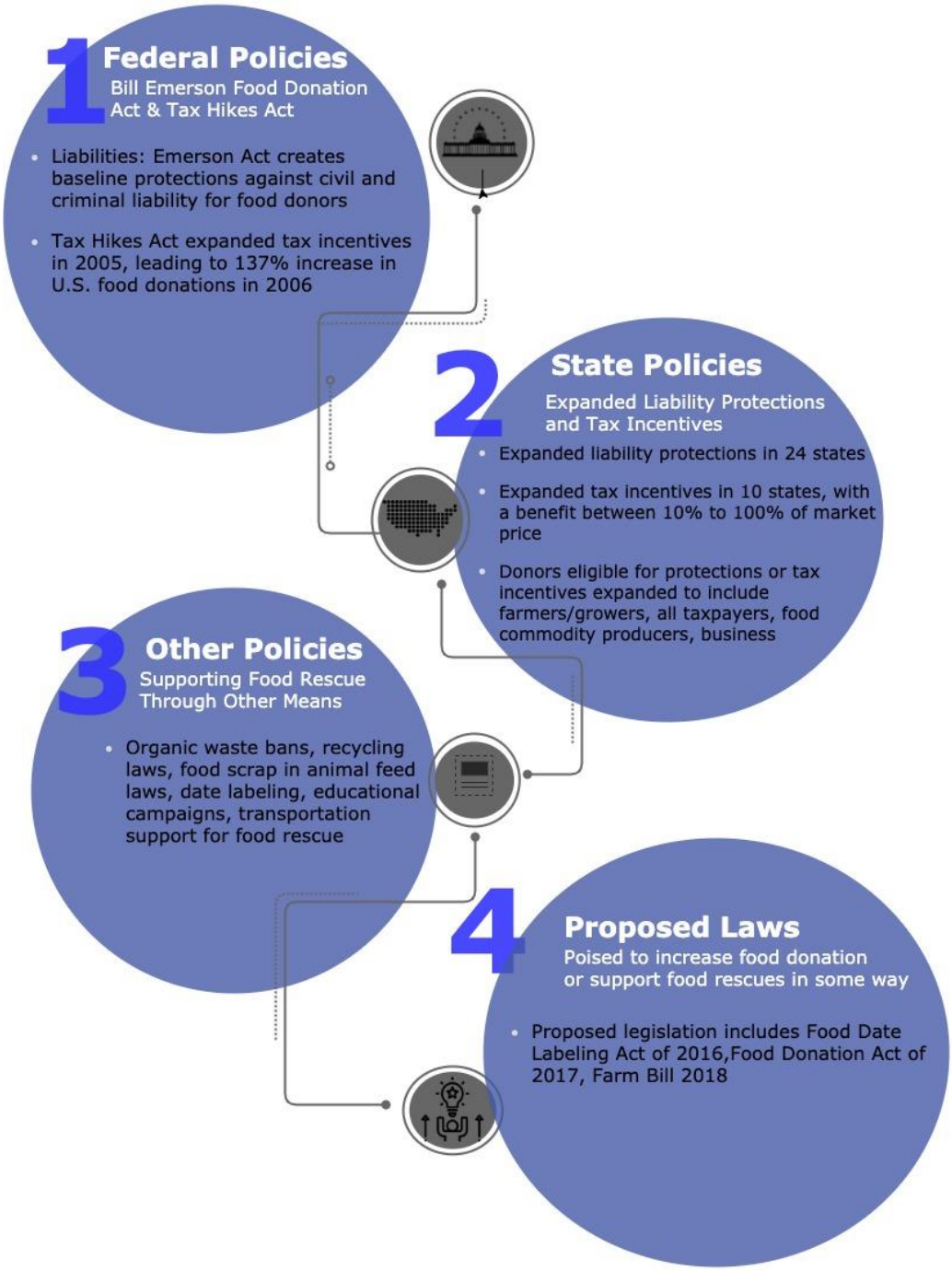
The following table compiles noteworthy tools for food rescue from several organizations. Note that titles are hyperlinked for accessibility.

Noteworthy Food Rescue Tools		
ReFED	ReFED Food Waste Policy Finder:	This interactive tool can be used to, "research current food waste policy at the federal and state levels and to discover best practices and recommendations for policy improvements that will support more food waste prevention, recovery and recycling."xxv
EPA	EPA Food Excess Opportunity Map	The map "as a whole, helps users understand the geographic dimensions of excess food as a resource, and identify potential recipients, such as food banks and composting and anaerobic digestion facilities, in lieu of landfills."
THE GLOBAL FOOD DONATION POLICY ATLAS	Food Policy Atlas	Developed by Harvard's Food Law and Policy Clinic, this interactive map outlines national laws relating to food donation in the U.S. and 15 other countries. Policy areas include food safety for donations, date labeling, liability protections for food donors, tax barriers, government grants and incentives
SUSTAINABLE AMERICA	Sustainable America's Food Rescue Locator	The locator is, "a directory of organizations across the United States that rescue, glean, transport, prepare, and distribute food to the needy in their communities." Consumers or businesses can use this tool to find organizations conducting food rescue near them.

	Boulder Food Rescue's Package Deal	This document remains the quintessential, "how to create a food rescue organization in your community," guide. From developing a mission to fundraising resources, this PDF is packed with first hand insights from Boulder Food Rescue's decade of experience.
	Legal Guide to Food Donation Policy and Grants for Food Rescue	Developed by Harvard's Food Law and Policy Clinic, this guide explains food donation law spanning federal to state government. The guide also highlights many federal and state grants which food rescue organizations can apply for.
Noteworthy Food Rescue Tools for Food Donors		
	Donor's Guide to Enhanced Federal Deduction for Food Donation	This guide provides a brief introduction to tax deductions for food. The guide aims to help taxpayers that are not C corporations to apply for the enhanced federal income tax deduction for businesses that donate food to a food bank or other charitable organization.
	Legal Guide to Food Recovery	The University of Arkansas produced this food donation legal guide. The tool outlines the reasons to engage in recovery for businesses and explains how the Bill Emerson Act Removes barriers to donations of food recovered for human consumption.

Policy Landscape for Food Rescue

Policies to support food rescue are formulated at the federal, state, and local levels, and come in the form of liability protections, tax incentives, date labeling standards, grants, and food waste penalties. The following figure highlights notable policies.



Notable Federal Policies

The Bill Emerson Good Samaritan Food Donation Act and the Protection from Tax Hikes Act create a federal floor for liability protection and tax incentives for food donation. Liability protections and tax incentives are the quintessential policy tools to expand food rescue. The Good Samaritan Act, establishes a baseline protection against civil and criminal liabilities. Liability protections do not cover cases in which death or injury to consumers of donated food when the person, nonprofit organization, or food gleaner engages in gross negligence or intentional misconduct. Gross negligence is explained in the Act, which defines gross negligence as, "…voluntary and conscious conduct (including a failure to act) by a person who, at the time of the conduct, knew that the conduct was likely to be harmful to the health or well-being of another person."

For an exhaustive list of those who qualify for federal liability protections, refer to the following table created by the USDA.[xxvi]

Entity	Who is Covered?
Backyard gardeners	Donations by backyard gardeners would be covered under the broad definition of "person," which includes individuals.
Farmers	The act expressly covers farmers.
Gleaners	The act expressly covers gleaners.
Restaurants, retail grocers and manufacturers	The act expressly covers donations by restaurants, retail grocers and manufacturers. Donations by a food service company also would be covered under the broad definition of "person," which includes corporations, partnerships, organizations, and associations.
Caterers	The act's definition of "person" expressly covers donations by caterers.
Food trucks	Donations by a food truck would be covered under the broad definition of "person," which includes corporations, partnerships, organizations, and associations.
School food authorities and institutions of higher education	Yes, these entities are expressly included in the definition of "qualified direct donors" in the Emergency Food Assistance Act of 1983, as amended by the 2018 Farm Bill.
Food banks	The act expressly covers donations by nonprofit food distributors.
Kitchens that create meals from donated food and then sell the meals at extremely low prices in underserved neighborhoods	No, for a donation to be covered by the act, the ultimate recipients of the food or grocery items must not be required to give anything of value.

The 2006 Tax Hikes Act expanded tax incentives through legislation for food donations. The Act had been expanded in 1976, 2005 (in response to hurricane Katrina), 2014, and 2015. According to ReFED, the expansion in 2005 led to a 137% increase in food donations across the country in 2006.[xxvii] The Act does so through the provision of both a general tax deduction, as well as an enhanced tax deduction.

The Katrina Emergency Tax Relief Act (KETRA) broadened eligibility for enhanced tax deductions to all businesses. After a decade of being extended temporarily, it was signed into permanent law in 2015 as an extension of the 2006 Tax Hikes Act. As such, all businesses are now eligible to receive an enhanced deduction for food donations, which allows a business to deduct the lesser of (a) two times the base value of a donated food item, or (b) the base value of the donated food plus one half of the food's expected profit margin. The following figure from ReFED illustrates the enhanced deduction with an example.

Figure 10: The Enhanced Tax Deduction Calculation under

Example: A grocery store donates potatoes with a fair market value of $100. The basis value of these potatoes was $30. The expected profit margin is the fair market value minus the basis value ($100-$30), which is $70. Under the enhanced deduction, the grocery store is eligible to deduct the smaller of:

1. Basis Value x 2 = $30 x 2 =$60

or

2. Basis Value + (expected profit margin/2) = $30 + ($70/2) = $65

The enhanced deduction would be $60, which is substantially higher than the general deduction (the $30 basis value).

To claim this food, an eligible business must meet the following criteria, per Harvard's FLPC:

- Business must have a dated record with description of the food being donated, a statement that the property is in compliance.
- A business must have a statement that the food donation will be used in compliance with I.R.C. 170(e)(3). This tax code states (1) food must be donated to a 501(c)(3) serving the ill, needy, or infants, and (2) the recipient organization must not sell or exchange the food for money, property, or services. There is an exception to the second rule for recipient organizations charging a small fee for administrative, warehousing, or other nominal costs.

Additionally, donated food must be wholesome, defined by the Good Samaritan act as "meet(ing) all quality and labeling standards imposed by Federal, State, and local laws and regulations even though the food may not be readily marketable due to appearance, age, freshness, grade, size, surplus, or other conditions." Food from grocers (the most common donor for FROs) must be "apparently fit," meaning it must meet all quality and labeling standards imposed by Federal, State, and local laws and regulations even though the product may not be readily marketable due to appearance, age, freshness, grade, size, surplus, or other conditions."

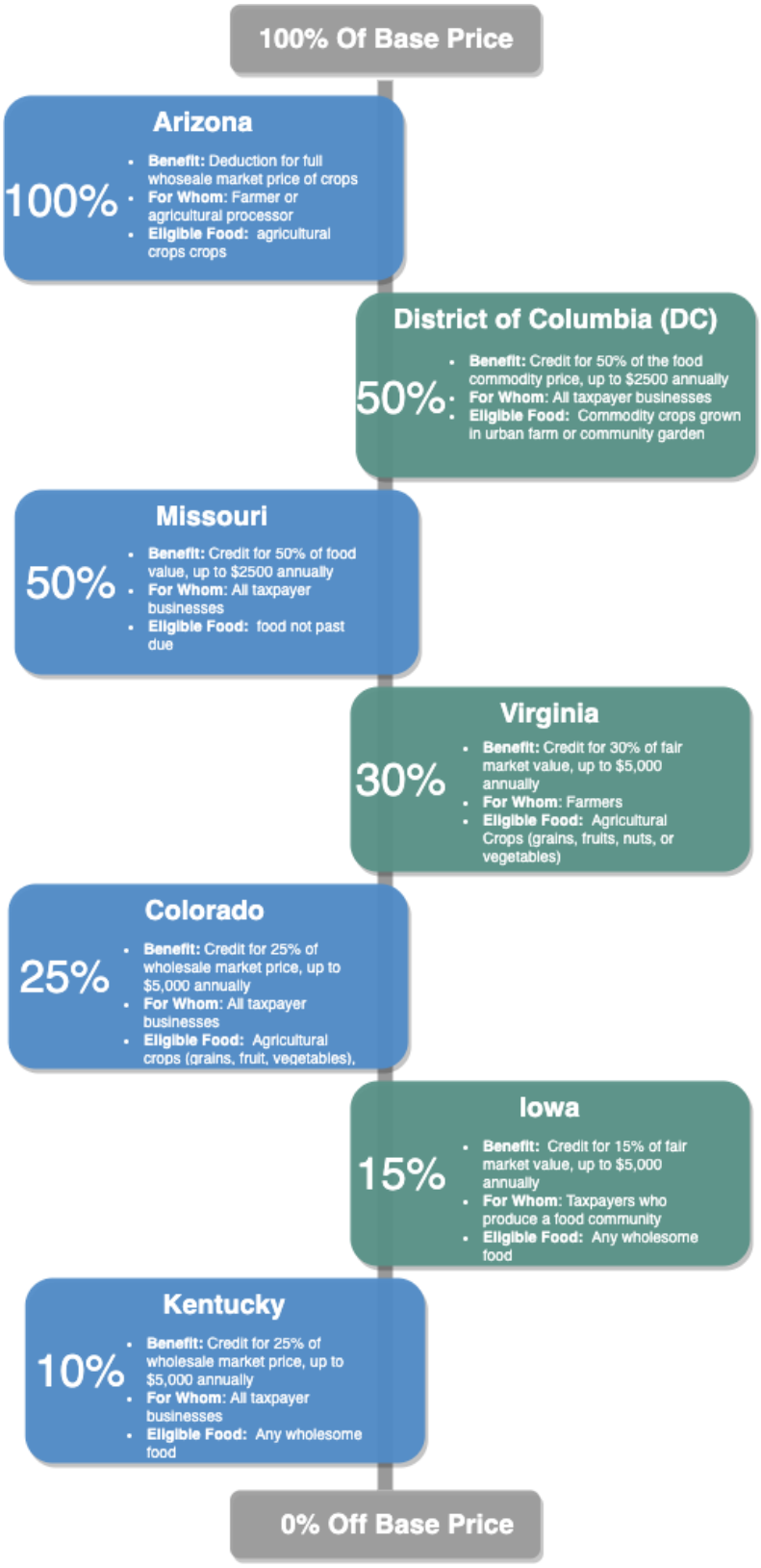
Note that ReFED proposes that an educational campaign regarding these policies could target food donors and greatly increase food donation. Gross negligence and intentional misconduct on behalf of the food donator is not protected. Importantly, no civil or criminal lawsuit has been filed about a food donation since the Good Samaritan Act.

Proposed federal policy to support food rescue includes the Food Date Labeling Act of 2016, Food Donation Act of 2017, and Farm Bill of 2018. In the absence of federal policy on food date labeling, states have enacted their own requirements. Note that ReFED proposed recommendations for strengthening federal donation policy. Included are proposed tax credits for low margin businesses, credit or deduction to support the transportation of donated food, and removing the "no charge" provision that bars FROs or other organizations receiving food donations from reselling the food. The following table compiles federal law relevant to food rescue.

Federal Law Relevant to Food Rescue		
Linked Title	**Policy Type**	**Description**
Bill Emerson Good Samaritan Food Donation Act	Liability Protection	The Emerson Act provides comprehensive civil and criminal liability protection for food donors and nonprofit organizations that distribute food donations to those in need, as long as they act without gross negligence or intentional misconduct.[xxviii] States may not offer any less protection below this federal floor.
Food Donation Act of 2008	Liability Protection	This Act provides government agencies the same liability protections afforded to business under the Bill Emerson Good Samaritan Food Donation Act.
FDA Food Code	Food Safety Requirements	FROs must abide by state food safety laws. These rules on handling, temperature control, and more come from the FDA Food code. Local, state, tribal, and federal regulators use the FDA Food Code as a model to develop or update their own food safety rules and to be consistent with national food regulatory policy.
Protecting Americans from Tax Hikes (PATH) Act	Tax Incentive	As of December 2015, all businesses that donate inventory may claim a tax deduction in the amount of the food's cost to the business. There is an enhanced deduction for donations meeting certain eligibility criteria.
Feeding Food Scraps to Animals Policy	Food Safety Requirements	The Swine Health Protection Act, the Ruminant Feed Ban Rule, the Food Safety Modernization Act Rules on Preventive Controls, and the Food & Drug Administration (FDA) regulations regarding adulteration and misbranding. Each of these federal laws and regulations function as a federal floor for the feeding of food scraps to animals.[xxix] Feed policies span topics including food waste donation, temperature control, restrictions on meat in feed, processing, labeling, cleanliness, and more.[xxx]
(Proposed) The Food Recovery Act	Food Safety Requirements	This Act includes various provisions to encourage farms, groceries, restaurants, and institutions to donate excess food to food recovery nonprofits, along with regulations and funding measures that will raise awareness, encourage composting and anaerobic digestion programs, and reduce wasted food in schools and the federal government.[xxxi]
(Proposed) Food Date Labeling Act	Food Safety Requirements	This Act would establish the first dual label system by mandating a quality date indicator and a safety date indicator on food nationwide. The Act also eliminates state laws banning sale or donation of foods past a "quality" date and includes funding for an educational campaign. Similar proposals were in the Food Recovery Act of 2017, which likewise remains introduced but unpassed by either the House or Senate.

Notable State Policies Intended to Increase Food Donation

Increasing food donations means helping FROs grow. States have a patchwork of legislation to increase food donations. This legislation builds upon federal liability and tax incentive legislation. In 2017, more than 33 bills regarding food waste were passed in 12 states. Ten states have responded with tax incentives for food donation equal to or more comprehensive than the federal tax incentive established in PATH. Figure 11 briefly outlines how select states have supported food donation within their borders through creating tax incentives for food donation. Depending on the state, the benefit may take the form of a tax deduction or a tax credit. The benefit is based off of some base value, most commonly the market price or wholesale market price. Eligible donors typically include restaurants, grocers, farmers, and other taxpayers. Eligible foods for donation tend to be agriculture crops, signaling a focus on fresh produce rather than shelf stable foods. Recipients tend to be food banks and other nonprofit hunger relief organizations.



While unconfirmed, interviews suggest that many of these tax incentives may only be claimed by organizations donating food to nonprofits above a certain size. For example, it was reported that growers in Colorado might only be able to donate to large nonprofits like Feeding America versus smaller nonprofits. While more research is needed to tease out the truth of the matter, this provision could crowd out FROs who are not part of Feeding America's network and other smaller FROs.

Some notable laws not included in the graphic include incentives to encourage the donation of game meats and livestock. For example, Oregon offers livestock producers and corporations 10% of wholesale market price for livestock in addition to crops. South Carolina offers $75 per deer carcass to any licensed meat packer, butcher, or processing plant seeking to donate to any nonprofit involved in hunger reduction.

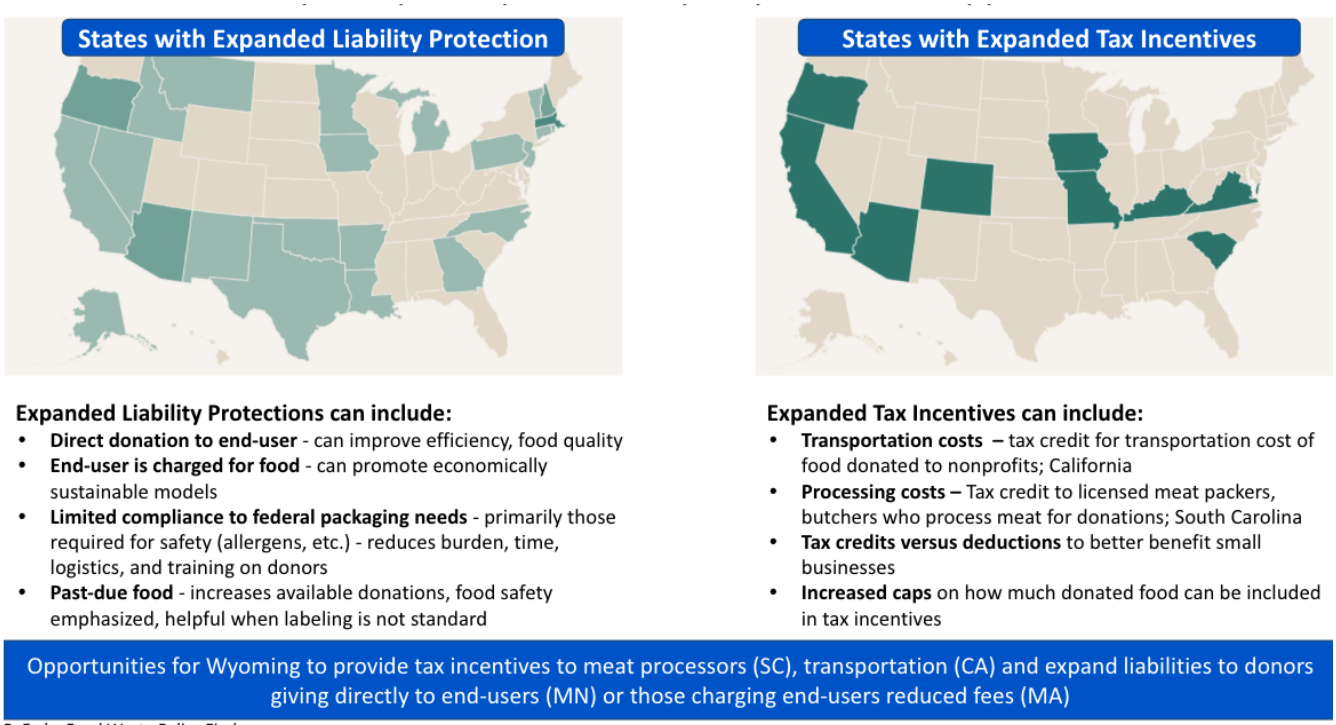
While liability protections and tax incentives are the quintessential policies to support food donation, there are others. Laws concerning organic waste bans, recycling systems, laws concerning feeding of food scraps to animals, and date labeling all increase food donations in some capacity. For example, Connecticut (Gen.

Stat. ann. § 22a-226e), Vermont (Stat. ann. tit. 10, § 6605k), Massachusetts (310 MaSS. Code ReGS. 19.01), Rhode Island (Gen. Law ann. § 23-18.9-17), and California (Pub. ReS. Code § 42649.81) have all joined the list of states with some form or organic waste ban or recycling laws. To see an exhaustive list of legislation supporting food donation, visit ReFED's U.S. Food Waste Policy Finder, powered by data from Harvard's FLPC.

Figure 8: More Darkly Shaded States Expand Upon Federal Floor of Liability Protections and Tax Incentives

Importantly, liability protections and tax incentives require substantially less investment than waste bans or recycling laws. In other words, the implementation of some of these laws requires a high investment in infrastructural systems. For example, food waste bans in Vermont and California have encountered challenges in communities without adequate supply of composting sites, biodigesters, or other infrastructure required to meet the new law's stipulations. In contrast, liability protections and tax incentives for food donation require less. In sum, state policies relating to food donation are fragmented

but growing.



Source: ReFed – Food Waste Policy Finder

In certain instances, waste bans can have a direct impact on food rescue through mandates and targeted funding, such as SB1383 in California. SB1383 concerns Short-Lived Climate Pollutants (SLCP) and is the first of its kind in having a mandate for food rescue alongside an organic waste ban. Passed in 2016, its mandates include a 50 % reduction in organic waste disposal from 2014 levels by 2020, a 75% reduction by 2025, and most relevant for this project – not less than 20% of edible food that is currently disposed must be recovered for human consumption by 2025[xxxii].

Jurisdictions are responsible for educating commercial edible food generators, increasing edible food recovery capacity, and monitoring commercial edible food generator compliance. In order to support these goals, a jurisdiction may fund these actions through franchise fees, local assessments, or other funding mechanisms, including grants[xxxiii]. Through California Climate Investments, CalRecycle provides millions in grants to reduce food waste and increase food rescue to help provide the infrastructure for this mandate[xxxiv]. One challenge of this law is that it seeks to recover 20% of edible food that would have been disposed at a jurisdiction-level but does not specify any requirements for individual food generators, specifically, which can lead to a free-rider problem over time.

Notable Grant and Government Funding Programs that Support Food Rescue

In addition to federal laws, the guide identifies grants available for organizations which conduct food rescue. These grants are compiled in the table below. Also included are government funding programs for the food assistance programs and food producers impacted by COVID-19.

Grants Available to Food Rescue Organizations		
Policy	**Policy Type**	**Description**
Emergency Food Assistance Program (TEFAP)	Food Supplement Program	This program serves low-income Americans living below the poverty line. Funding comes from the Farm Bill. The program provides funding to supplement the diets of low-income Americans by providing them with emergency food assistance at no cost. Under TEFAP, local agencies (usually food banks) receive food purchased by the USDA as well as financial assistance for administrative expenses.
Value-Added Producers Grant Program (VAPG)	Grant Program	This program helps farmers get involved in value-added efforts related to the processing and marketing of products, with the goal of developing new products, expanding marketing opportunities, and increasing producer income. VAPG grant funding ranges from $75,000 for a planning grant to $250,000 for a working capital grant.
Local Agriculture Marketing Program (LAMP)	Grant Program	This grant program combines two pre-existing programs, the Farmers Market Promotion Program (FMPP) and the Local Food Promotion Program (LFPP)—also now states that the funding can be used to support food recovery and business opportunities aiming to reduce food waste on farms.
Community Food Projects Grant Program	Grant Program	This program awards grants to eligible nonprofits, tribal organizations, and food program service providers to promote self-sufficiency and increase food security in low-income communities by developing comprehensive, community-based solutions. Grants in this program range from $35,000 - $400,000.

Government Funding Programs for Food Assistance Programs and Food Producers Impacted by COVID-19		
Policy	**Key Impact**	**Description**
CARES Act, S. 3548	addresses hunger, agriculture, food system through program expansions, disaster relief, and redirecting funds	This Act funds a number of programs. These include SNAP, particularly in underserved areas; disaster relief program for growers, replenishing the Commodity Credit Corporation (CCC), and foodservice establishments relief programs (Paycheck Protection Program, etc.)
Families First Coronavirus Response Act, HR6201	expands food and nutrition program, primarily SNAP	This bill responds to the COVID-19 (i.e., coronavirus disease 2019) outbreak by providing paid sick leave, tax credits, and free COVID-19 testing; expanding food assistance and unemployment benefits; and increasing Medicaid funding. It also suspends work requirements for those who receive these benefits.
USDA Food and Nutrition Service (FNS) Waivers	allows flexibility for schools to provide food to children	These waivers add flexibility for recipients of food assistance programs including Childhood Nutrition Program (CNP) Special Supplemental Nutrition Program for Women, Infants, And Children (WIC), and others. Specifically, the waivers suspend certain requirements and restrictions that limit food distribution to children, including expanded time frames, places for distribution.
Supporting Older Americans Act 2020	reauthorizes Older Americans Act (OAA) through 2024	This act provides for congregate and home-delivered meals, transportation services, and other care services.
Coronavirus Food Assistance Program	provides up to $16 billion in direct payments for farmer or rancher relief	Provides financial assistance to producers of agricultural commodities who have suffered a five-percent-or-greater price decline due to COVID-19 and face additional significant marketing costs

Notable Local Policies that Support Food Rescue

FROs may also qualify for state or city specific grants. New York City's Microgrant Program offers $2,000 grants for small business to implement food waste reduction solutions. Between 2017-2019, San Francisco's Zero Waste Program disbursed $857,000 to nonprofits conducting a myriad of waste reduction efforts. Another program, California Food Waste Prevention and Rescue Grant Program, disbursed grants in the amount of $50,000 to $500,000 to qualifying organizations which seek to reduce or reuse food. Nonprofits received a share of the $5.75 million disbursed in the 2018-19 fiscal year. In short, searching for state or local funding might prove helpful for FROs as government grant programs broaden their scope to include food rescue.

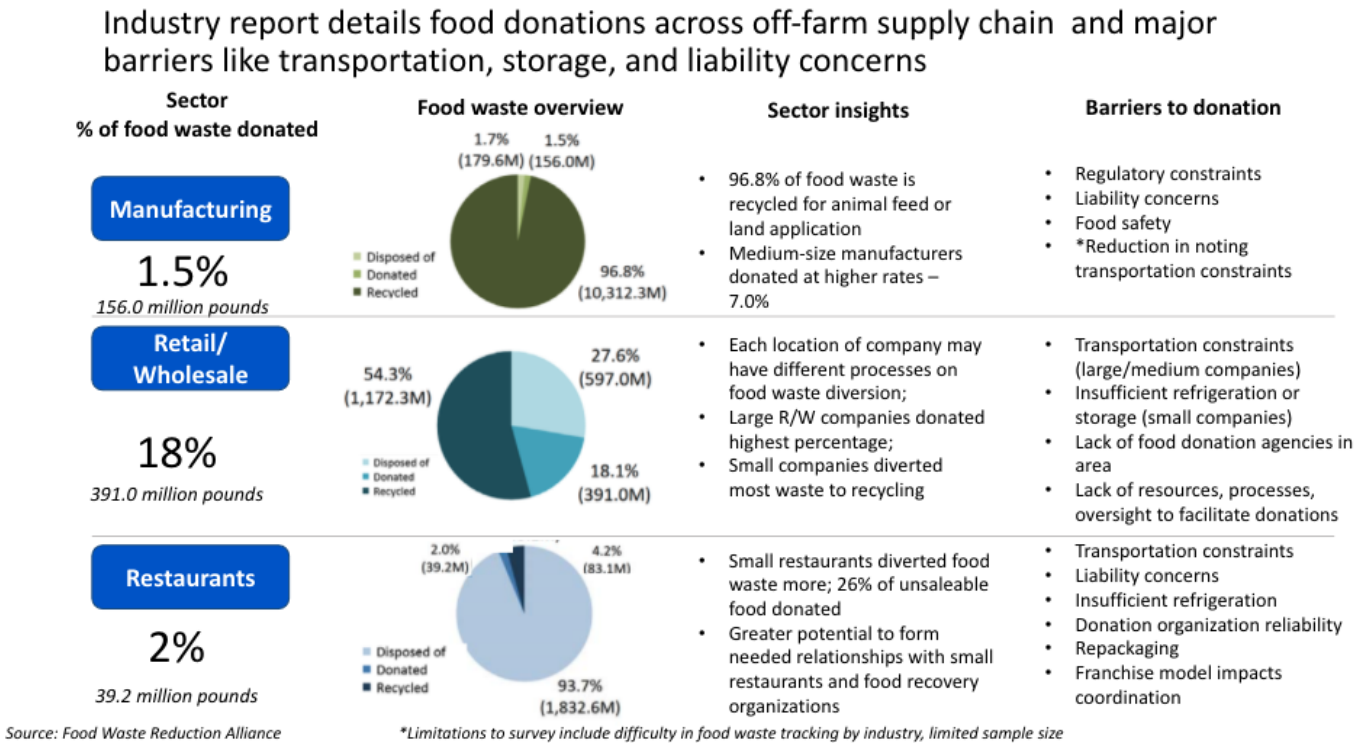
Challenges to Organizations Conducting Food Rescue

The Cornell research team is not the first to identify the challenges and needs of FROs. Because food rescue happens at the intersection of food business and nonprofits, challenges for both are outlined here.

Primarily, food business faces several barriers to donation which vary based on segment of the sector. The Food Waste Reduction Alliance conducted a survey of food business, asking for each segment's biggest barriers for food donation.[xxxv] Manufacturers reported regulatory constraints, liability concerns,

and food safety requirements as their biggest barriers to food donation. Retail food business reported transportation constraints, lack of donation options, and donation systems in place. Finally, restaurants reported transportation, demands of repackaging prepared food, and liability concerns. Another study by Johns Hopkins University found that regulation, transportation, refrigeration capacity onsite, and refrigeration capacity at food banks as the most significant barriers to food donation.[xxxvi] These barriers from the studies are summarized in Figure 9 below.

Figure 9: Barriers to Food Donation, Grouped by Segment of Food Business[xxxvii]



On the nonprofit side of food rescue, FROs cite barriers as well. These include barriers in funding, physical space, staffing, need for enduring relationships and communication between donor and recipient organizations, need for information on how to donate food and maintain food safety, and limited cold storage capacity.

Proposed Solutions and Innovations in the Space

Technology
Technology creates opportunities for automation, improved communication, and scalability. In a world where technology governs so much of our daily lives, it is no surprise that technology is quickly becoming a pivotal tool in supporting and scaling food rescue efforts. Some food rescue applications focus on matching excess food to needs, providing transportation logistics, managing volunteers, measuring and tracking data, or a combination of these features.

Meal Connect, operated by Feeding America, connects local nonprofits with food donations. The food donated is often rescued from FROs and distributed through food banks and food pantries. It also monitors pickup activity and generates donation receipts, NYC Food Policy Reports. Currently, Meal Connect has recovered 2.3 bn pounds of food through its network of food banks and FROs[xxxviii]. The organization has served over 9,395 nonprofits and has completed 6.1 million pickups as of January 2021.

The **MEANS** database is an online platform that allows food donors to post information about the food they want to donate, streamlining the process of looking for recipients, saving time, effort, and essentially money. The platform also provides them with information to claim federal tax deductions in an easy-to-use format. Food banks and food pantries can post what food items they need and how far the food banks/pantries can travel, receive real-time email notifications of available food and locations, and claim the food with the click of a button. Food is usually claimed within the hour through its network of over 3000 nonprofits[xxxix]

™ is a zero-food waste platform that supports the reduction and prevention of food waste and redistributes excess food to communities in need. Copia ™ focuses on prepared food from commercial

kitchens and uses real-time demand signaling to quickly connect excess food and those in need. Copia™ manages all distribution and ensures chain of custody to comply with food safety efforts to reduce pressure on nonprofits. They also provide data on waste and donation for commercial kitchens to support tax deductions and improved procurement processes. The platform has transformed from a non-profit to a for-profit company and has scaled to over 300 cities in the U.S driven by engaged food donors. Copia™ charges a volume-based fee to food businesses like a disposal fee. Copia™ has rescued 3.4M lbs of food. It has been promoted as the platform that CalRecycle is using to help achieve its goal of recovering at least 20% of edible food that is thrown away by 2025.

Chow Bank[xl] seeks to make donation easy and connect food where it is needed. The app allows you to communicate with donors and provides historical information on donations.

ChowMatch connects surplus food from restaurants, grocery stores, farms and others to family shelters, schools, and other food assistance organizations. ChowMatch is most commonly sponsored by a local food recovery organization or government agency. Excess food is posted on the platform, and a food runner is assigned to help transport the donated food. This platform is free to business to donate food but its enterprise plan uses matching logic to connect donors and recipients. The enterprise plan also provides tax-related information, food safety information, and other administrative support. Currently, ChowMatch[xli] is available in over 500 cities.

Food Cowboy
The NYC Food Policy Center's report notes **Food Cowboy** as one of the more comprehensive models. This app helps companies manage food that is in transport or a warehouse. Drivers with rejected food deliveries can find recipients for food donations along their route or a compost site. Food banks will coordinate to meet drivers along their path.

Food Connect
This app connects restaurants, food retailers, and caterers who want to donate their surplus food and non-profits. The app allows food donors to input information on scale and type of food being rescued and desired time. The Food Connect team manages the logistics in making sure food reaches its final destination.

Foodsharing.de
On this open-source German website, individuals, supermarkets, restaurants, bakeries and food stalls can post information about excess food and arrange pickups. The food is rated based on quality when picked up to promote accountability and reduce desire to donate low-quality foods. Since 2012, this site has helped prevent 50 million pounds from being discarded.

Similar to other applications mentioned, **Replate** is working to make food rescue easier. "Food rescuers" from Replate are dispatched to business with excess food once a request is made. They then deliver the food and provide tax, social, and environmental information to visualize and measure the impact the donations have. Replate creates flexible plans for different businesses based on the amount of pick-ups needed and their frequency. Replate has recovered 2.7 million meals since its inception.

Food Rescue Hero is based in Pittsburgh and has tangible impacts in Cleveland, Philadelphia, San Francisco, Northern Virginia, Los Angeles and Vancouver, B.C. This community-powered network relies

on volunteer drivers to transport surplus food when they are nearby an available source. Food Rescue Hero looks to high-impact food rescue or hunger relief nonprofits to help scale and launch the application in their community. They have a detailed on-boarding process that supports capacity-building in FROs. It was developed and is hosted by 412 Food Rescue in Pittsburgh – the only food rescue technology to be hosted by a FRO. They have recovered 35 million pounds of food to date. They were awarded the Fast Company's 2020 World-Changing Ideas Awards in the app section[xlii].

FarmLink developed during the initial shutdown of 2020 when farms and large agricultural producers were unable to distribute food through their traditional wholesale channels. In a short amount of time, FarmLink has been able to scale and reach 43 states in less than a year, recovering over 21 million pounds of nutritious food and produce. They work primarily with food banks and facilities that can manage large donations. The organization has also been able to pay farms for their produce as well as the drivers who are transporting their food. They work with a number of transportation logistics companies, including UberFreight and have been able to transport food across multiple states to where it is best fit.

Innovative business models

Transit partnerships

Transit has emerged as a core issue – who will transport the food and how. Partnerships with rideshare companies may be a helpful solution. FarmLink, a FRO started during the pandemic to connect excess farm supply with food banks, has worked with UberFreight to help transport large quantities of food. Replate established a partnership with DoorDash called Project Dash in 2018 to help supplement food deliveries. Other food rescue platforms such as Copia™ and 412 Food Rescue have also built partnerships with DoorDash to support food rescue.

Fee-for-service

Fee-for-service models have also emerged as promising frameworks for FROs and applications. Food Rescue Hero, launched and licensed by 412 Food Rescue in Pittsburgh, uses a fee-for-service model, as does Replate, Copia™, and Food Cowboy. In their words, "Food Rescue Hero is a game-changer for mobilizing volunteers, data tracking, etc." Rescuing Leftover Cuisine in Boston also employs this model. In this model, food donors pay to have food picked up, regular pick-ups may have a lower price point than one-time pick-ups. This allows these businesses to be more sustainable by creating a revenue source which is often priced competitively to traditional waste transfer. Copia™ receives a volume-based fee from food donors and has customized payment plans.

Supermarket stocked with donated or unsold food

The Daily Table is a non-profit retailer that sells healthy food at discounted prices. Most of this food is recovered, however, some is purchased at discounted prices. Clients must sign up for a free membership to shop, and this format allows individuals to make preferences based on their choices.

Upcycled Food Items

Upcycling has become an effective and profitable intervention. Per the UFA, upcycled foods, "use ingredients that otherwise would not have gone to human consumption, are procured and produced using verifiable supply chains, and have a positive impact on the environment." The upcycled foods movement grows, and 2020 data from Forbes valuated the industry at 46.7 billion. UFA members are

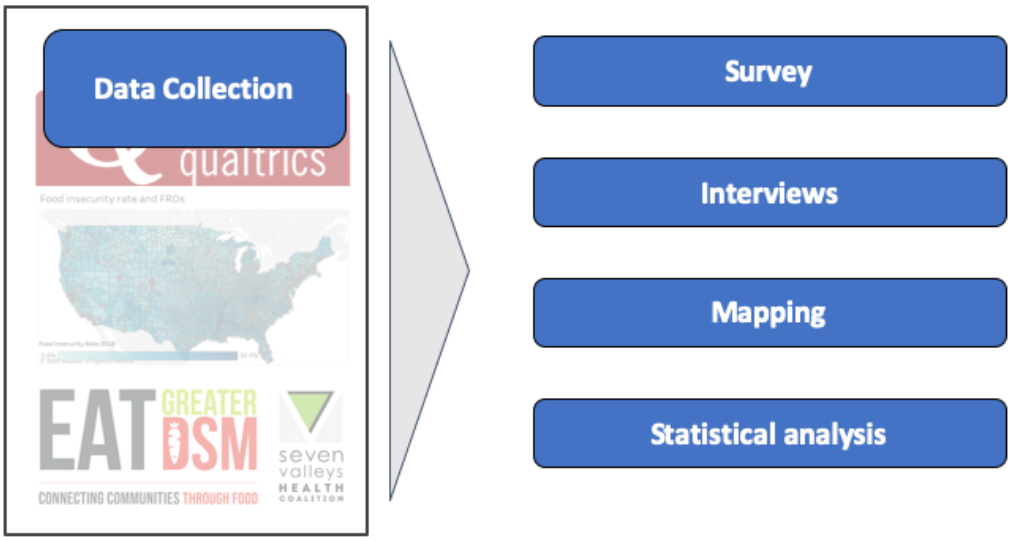
not limited to startups and include giants in processing and manufacturing. Both Dole and Cargill are members offering an upcycled product.

Methodology

This research adopted a mixed-method approach to answering the core questions set out by the client and research team. This included a comprehensive literature review, a survey, semi-structured interviews, conversations with technology companies, as well as regression and geospatial analysis.

The literature review canvassed Google Scholar, leading publications, and other secondary research sources regarding key players, scale and potential of food rescue, key challenges, relevant technology, and relevant policies supporting the space.

The literature review shaped further questions for more targeted data collection that included a qualitative, quantitative, and geospatial analysis.



Data and Analysis

1. **Survey (Mixed qualitative/quantitative):** A 50+ question survey was designed for organizations conducting food rescue. Research team partnered with Sustainable America and Food Rescue Alliance to design the questions and distribute the survey. Survey received 56 responses from a pool of approximately 220 (based on the list from Sustainable America and Food Rescue) – a 25% response rate. The survey included both structured and open-ended questions across five categories:
    a. Introductory questions
    b. Needs assessment
    c. Policy
    d. COVID-19
    e. Technology
2. **Interviews (Qualitative):** In addition to the survey, approximately 20 interviews were conducted with leaders and directors of food rescue and sustainability organizations using semi-structured discussion guides. These allowed deeper insight to challenges and approaches given the unique nature of various FROs. Select survey respondents who provided extra information were contacted for follow-up conversations.
3. **Mapping (Geospatial):** Geospatial data sets of FROs and food banks from Feeding America, EPA, and Sustainable America were used to map the landscape of food rescue in the U.S via Tableau. Geospatial data of FROs and food banks were overlaid with other demographic factors like food insecurity, metropolitan status, and policy to provide a visualization of the relationship between different demographic and policy factors and the presence of FROs. Socioeconomic, geographic, and policy data were gathered from Feeding America, USDA ERS, and ReFED, respectively.
4. **Statistical analysis (Quantitative):** Methods include data analysis on survey results and a regression analysis on the presence of FROs, demographic factors and the policy landscape. The regression analysis included the demographic and policy information included in the geospatial analysis to quantify the visual relationships from mapping.
    - **Variables**

- Data is from 2018 to promote suitable comparisons across different factors. It excludes the economic and food system shocks of 2020.
- **Demographics**
  - 2018 census data from the U.S. Census Bureau to determine age and racial grouping by county
- **Socioeconomic Factors**
  - County-level food security data from Feeding America for data on general and childhood food insecurity rates from 2018.
    - Food insecurity used in t-test analyses, not regression analyses
    - Food insecurity can be impacted by the presence of FROs and is thus not an independent variable
  - County-level data on % of total people and people under 17 years old in poverty, unemployment rates, population, and median household income from U.S. Census Bureau and USDA Economic Research Service (USDA-ERS)
  - County-level data on charitable tax donations per taxpayer from the IRS
- **Geographic factors**
  - Measurement of rural, urban, metropolitan status via rural-urban continuum code which tracks population size and metropolitan status (1 being the largest, most metropolitan county and 9 being smallest, most rural counties) from USDA-ERS
- **Policy factors**
  - State-level policy data from ReFED to assess state-level expanded liability protections across four key sectors defined by ReFED. These are delineated as binary variables.
    - Four key sectors for expanded liability protections are as follows:
      - Limited labeling requirements
      - Past-date food
      - Donating directly to end recipients
      - End recipient pays for donated food
  - Binary variable that notes whether a state has either expanded liability protections or tax incentives.
  - Two additional policy-related binary variables: one variable that accounts for if a state has any type of expanded liability protections (from the four categories) and another variable that classifies if the state has expanded tax incentives or not.
  - Additional policies outside of these four groupings related to liability protections and expanded tax incentives or county-specific policies are not included which may lead to omitted variable bias.

- **Regression approach**
  - Linear probability model employed to assess what factors helped to increase the probability of the presence of a FRO(variable name - FROexist). Multiple regressions performed that looked at combinations of demographic,

socioeconomic, and policy factors. One set of regressions looked at the binary variable that measures the presence of expanded liability protections or tax incentives, another set employs both binary variables that look at the two policy factors, and another set looks at the four types of expanded liability protections and tax incentives while controlling for demographic and socioeconomic factors.

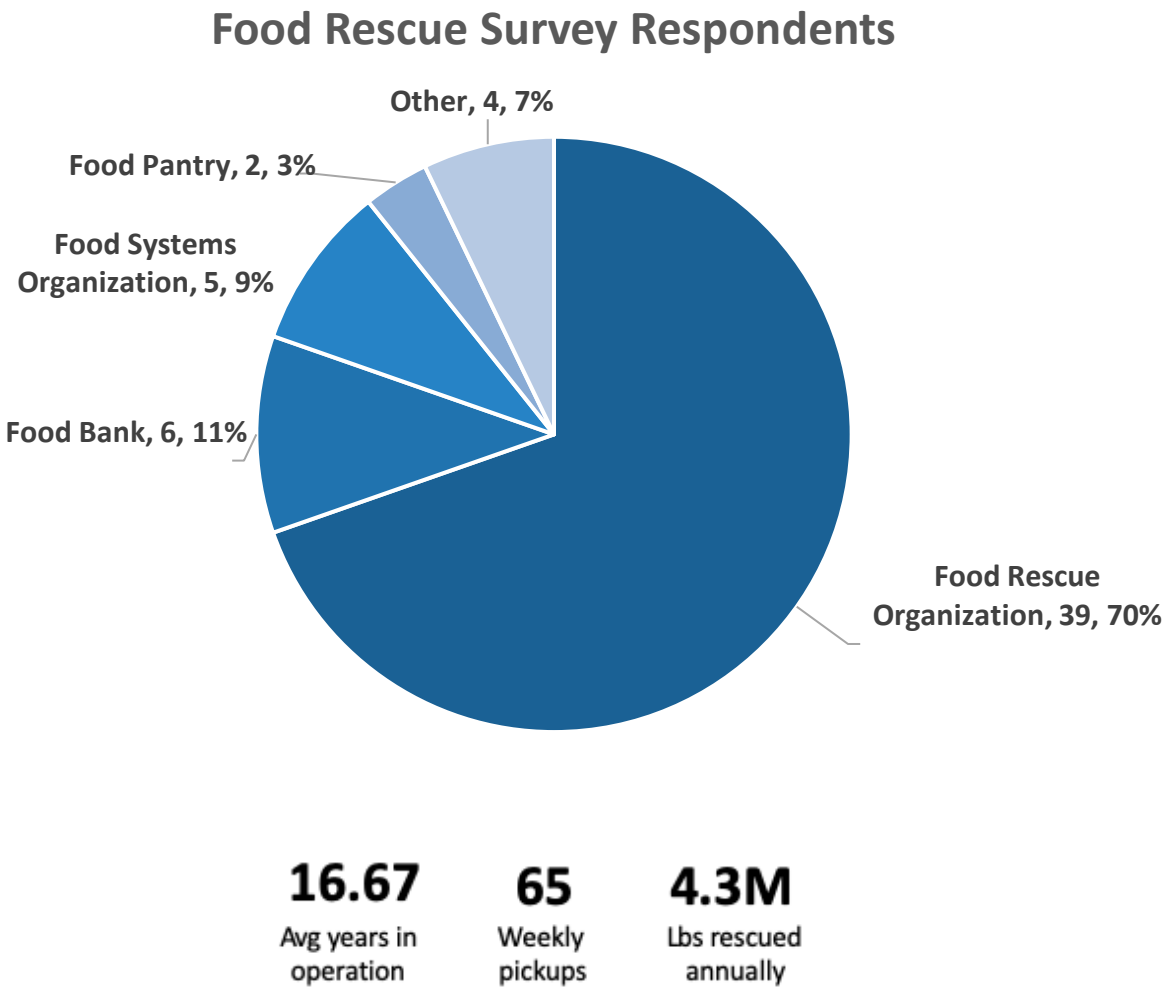
- Key to acknowledge there are many additional variables that impact the presence of FROs that are hard to quantify, such as organizational leadership, presence of grocery stores, potential food donor management. Interpretation will be impacted by omitted variable bias, however, other aspects of research seek to address this.

Findings

A brief overview of findings is included below as a preface to a further analysis in the following section.

Survey Results

56 responses of organizations conducting food rescue from across the U.S.



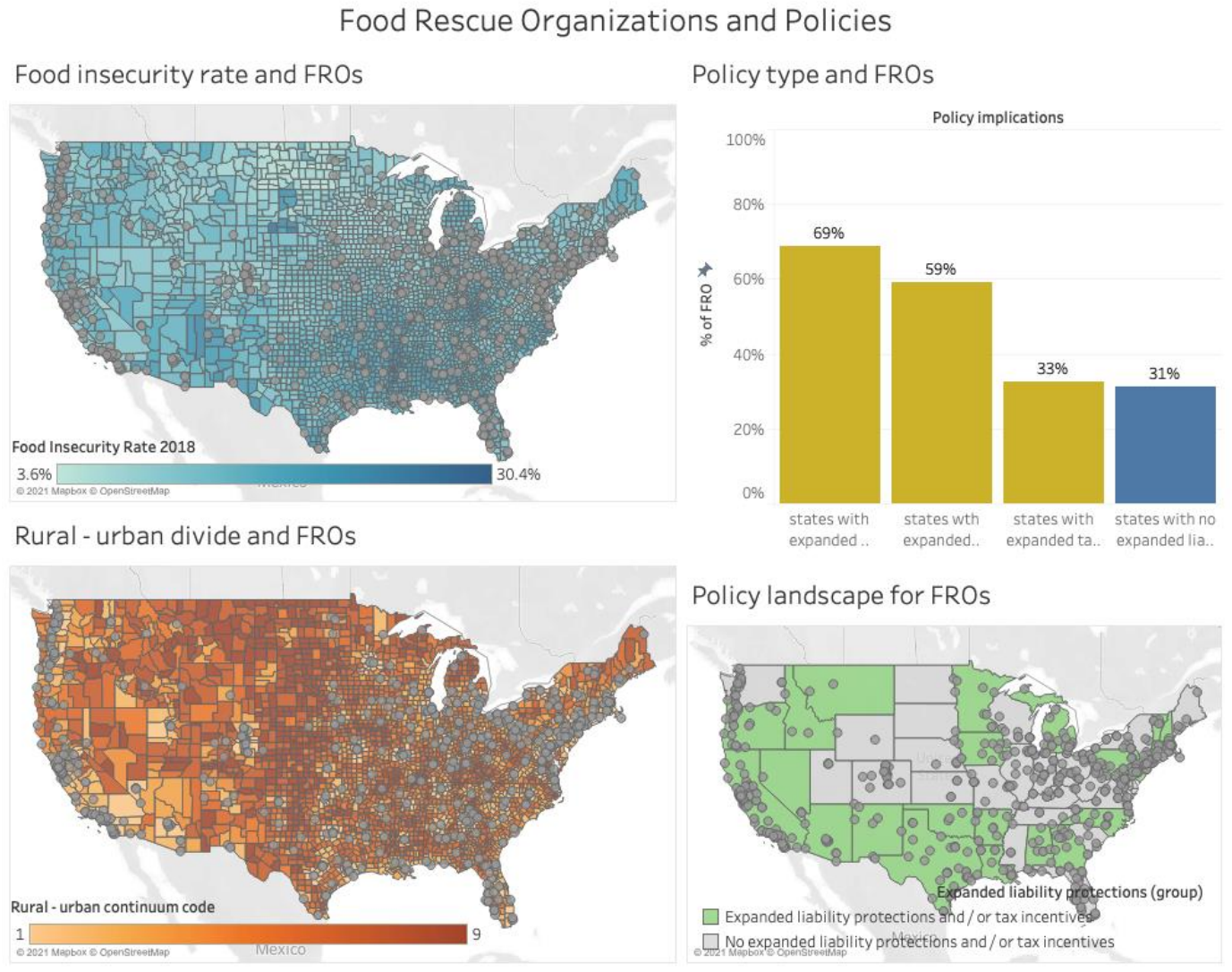
Respondents selected how they self-identify to better understand the primary mission of their organization. Definitions for food bank and food pantry are those used by Feeding America, a leading organization in the food rescue and donation space.

For this study, **food banks** refer to organizations that collect products from the food industry and food drives, stores it, and distributes it to agencies that provide food directly to individuals in need. Food banks may not always be directly involved in the activity of rescuing food. Food pantries refer to organizations that obtain food from, and is a member agency of, a food bank and distributes food to people in need.

Food rescue organization refers to an organization whose main activity is to rescue food. These organizations may work with other organizations in the food rescue ecosystem to distribute food to people in need – or this activity may be conducted internally.

Food systems organizations is a broad term and can refer to a diverse set of organizations whose activities extend beyond food rescue. This may include education around food, producing food in gardens, policy advocacy, job training, etc.

Sustainable America and Food Rescue Alliance were key partners to distribute the survey. These organizations primarily contain FROs which were the target demographic. This is reflected in the survey responses.



Geospatial analysis

The dashboard above provides an overview of geospatial analyses conducted using the collected data. The graphs are explored further later and can be found on Tableau Public here. The top left graph

visualizes general food insecurity and FROs. Darker counties have a higher level of food insecurity. The gray dots represent FROs. The bottom left graph visualizes counties along the rural urban continuum code. Counties that are darker have lower populations and are more rural. Lighter counties are more urban and have higher populations. The gray dots represent FROs. The graph on the bottom right corner visualizes the policy landscape and FROs. States in green have either expanded liability protections or tax incentives. The gray dots represent FROs. The top right charts measure the % of FROs and % of population compared to different policy types – states with expanded liability protections and/or tax incentives, expanded liability protections, expanded tax incentives, and states with neither expanded liability protections or tax incentives.

Statistical analysis

Table 1

Analysis of demographic, socioeconomic, and policy factors on the presence of FROs

Model summary

Number of observations	R-squared	Root MSE*
3139	0.316	0.27737

Factors	Coefficient	Robust standard error	t	95% confidence interval Lower bound	Upper bound
Unemployment rate*	-0.0154813	0.0063299	-2.45	-0.0282017	-0.0027609
% of population in poverty	0.001023	0.0024993	0.41	-0.0039996	0.0060456
% of population under 19 years old*	-0.0057717	0.0017217	-3.35	-0.0092316	-0.0023117
% of population above 65 years old	0.0015637	0.0019326	0.81	-0.0023201	0.0054475
% of population that identifies as white*	-0.0030104	0.0009436	-3.19	-0.0049067	-0.0011141
Percent of population that identifies as black*	-0.0019368	0.0009604	-2.02	-0.0038668	-6.87E-06
Percent of population that identifies as Hispanic*	0.0014673	0.0003876	3.79	0.0006885	0.0022462
Population*	0.1179506	0.0090296	13.06	0.0998048	0.1360963
Median income	0.025847	0.0742879	0.35	-0.1234402	0.1751342
Charitable giving per taxpayer*	-0.043563	0.013332	-3.27	-0.0703547	-0.0167713
Expanded liability protection when final recipient pays	0.0254218	0.0186692	1.36	-0.0120953	0.0629389
Expanded liability protection when donating directly to final recipients	-0.0033203	0.0228553	-0.15	-0.0492497	0.042609
Expanded liability protection when limited labeling is required*	0.2243644	0.0534386	4.2	0.1169754	0.3317534
Expanded liability protection when donating past-date food*	0.0794353	0.0357894	2.22	0.0075137	0.1513568
Expanded tax incentives	0.0070431	0.0217227	0.32	-0.0366103	0.0506965
Constant	-0.8615724	0.8877988	-0.97	-2.645671	0.922526

*Significant at p=0.05

This regression analysis describes which policies or factors are significant in increasing the probability of the presence of a FRO in a county. Of the factors listed, liability protections that limit labeling requirements and allow donations of food past the expiration date (not a measure of food safety) are the most significant. Population is also a strongly significant measure as well. Using these three most determinant factors only, the regression presents a similar correlation.

Table 2

Influence of most significant factors on presence of FROs

Model summary					
Number of observations	R-squared	Root MSE**			
3142	0.2955	0.28113			
				95% confidence interval	
Factors	Coefficient	Robust standard error	t	Lower bound	Upper bound
Population*	0.118963	0.0081497	13.73	0.0955272	0.1282653
Expanded liability protection when limited labeling is required*	0.275921	0.0426893	6.46	0.1901771	0.3616648
Expanded liability protection when donating past-date food*	0.1384386	0.0198919	6.96	0.0984845	0.1783928
Constant	-1.031291	0.0843469	-12.23	-1.200706	-0.8618748

*Significant at p=0.05

**Standard error adjusted for clustering

Demographic factors alone were not largely influential on the presence of a FRO.

Analysis

This research centered around questions related to key topics in the figure to the right. The analysis seeks to use the data collected to answer these questions. These analyses will first explore mapping and statistical analysis where applicable and leverage qualitative and other quantitative data afterwards. Later sections leverage this information to provide recommendations designed to support FROs.

Food Rescue Models

What are the models of food rescue?

Summary: *FROs are varied and often adapted to community needs. As discussed before, models range from solving singular issues like hunger to transforming relationships with the food system. While there are often organizations involved, individuals participate directly in food rescue by recovering food from dumpsters, retail, or commercial kitchens. Some organizations maintain lean structures while others are heavily staffed, and reliance on volunteers is often significant.*

Food rescue models are incredibly variable in how they contribute to the food rescue landscape. On a high-level, these models can range from concentrated to systemic in terms of how they approach the goal of food rescue. Food banks are usually covering large geographic regions and populations and are concentrated on reducing immediate hunger. FROs are serving a wider mandate to reduce waste as well as reduce hunger, making their goal less concentrated. Food systems organizations address hunger from a systemic approach, considering waste and food insecurity as well as structural causes to poverty and knowledge about nutrition and the food system. These organizations highlight education and connection to additional wellbeing resources. This is not to say that food banks or FROs do not also explore or support these issues, but it is less of their focus, however the importance of these issues are becoming more discussed and addressed in all forms of food rescue.

From traditional to transformative approaches to reducing hunger, organizations conducting food rescue are adapting their approach to become more systemic, entrenched, and create long-lasting change. An article from Johns Hopkins Bloomberg school supports this claim noting that "interventions targeting the root causes of food insecurity and wasted food would be more effective and would provide co-benefits in wellbeing as well as resource use[xliii]."

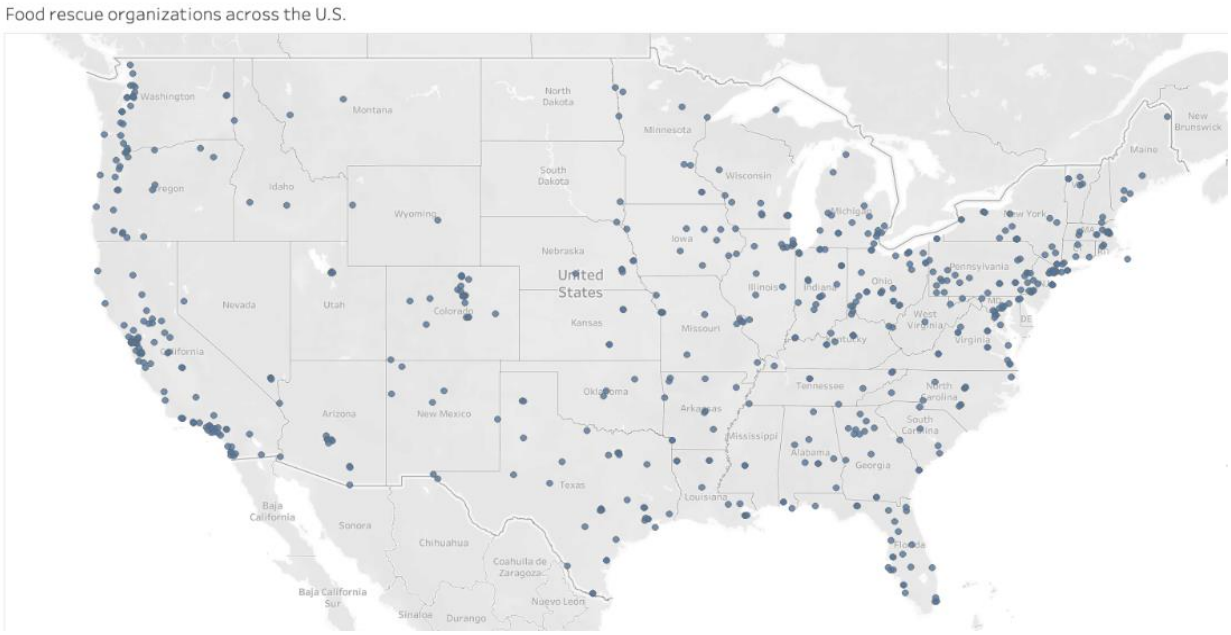
Organizational models and approach also impact staffing requirements. Some organizations that operate as connectors and match food needs can operate lean structures with few full-time staff and volunteers. Those who take a more hands-on approach in transporting food will require more staff but largely more volunteers, increasing scale as well as consistency. Organizations that have to re-package and redistribute food will require even more manual support via paid staff or volunteers.

Geographical Landscape of Food Rescue

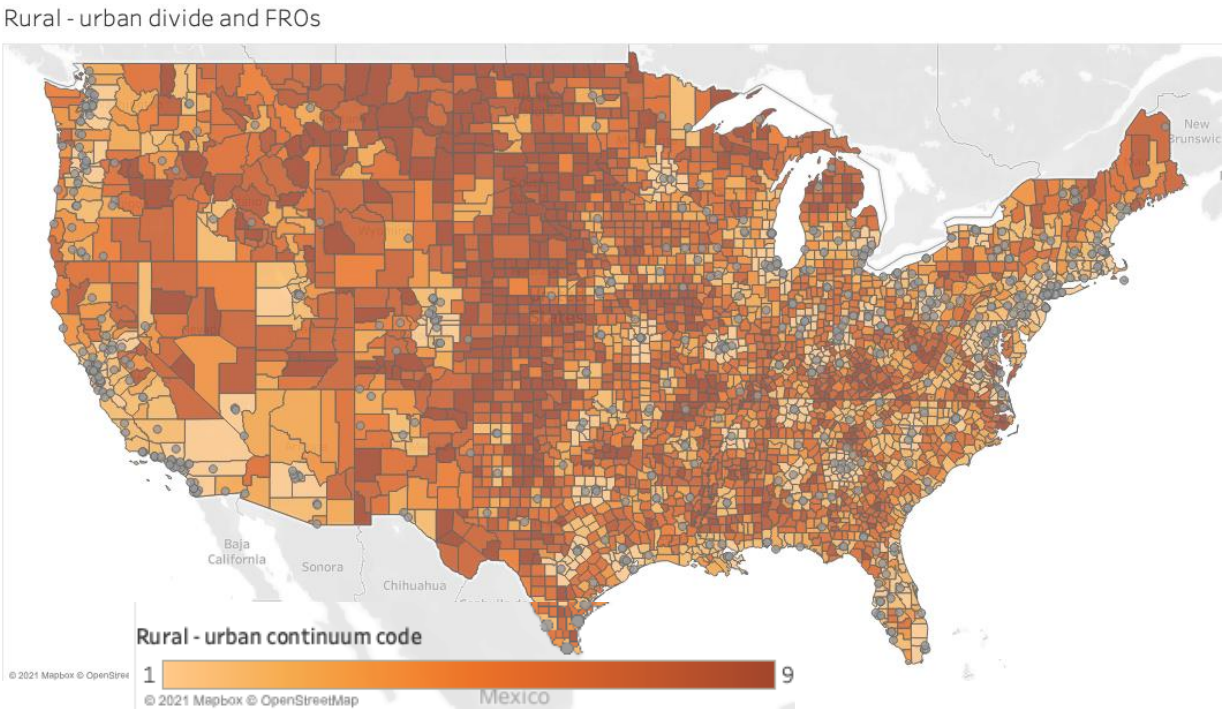
Where is food rescue located? What demographic factors influence the presence of FROs?

Summary: *Geospatial analysis shows FROs are most prevalent in dense, urban areas, primarily on the coasts and the area east of the Mississippi. 75% of FROs are in metro area counties with a population of 250,000 and higher. The presence of FROs is most highly correlated with counties with a high population - urban centers. Urban centers can also have a higher density of food generators – grocery stores, restaurants, catering services, etc., that could predicate the presence of FROs. While age, race, ethnicity, and income are not largely determinant of where food rescues are or could be, counties with FROs have statistically more diverse populations, more Hispanic populations, higher incomes, and experience more charitable giving. This is also highly correlated with the urban nature of these counties.*

Food rescue organizations across the U.S.



Visualizing the spatial distribution of FROs reveals that these organizations are clustered along the coasts as well as the region east of the Mississippi where between 29[xliv]-40%[xlv] of the U.S. population and over half live, respectively.



The map above overlays FROs with county metropolitan status which also notes population size. Counties are numbered using the USDA rural urban continuum code (RUCC) on a scale of 1 to 9. On this scale, 1 being the largest and most urban while counties with a rank of 9 are the smallest and most rural

(full scale below). Counties that are lighter in color have larger populations and are more urban. Those that are darker in color have smaller populations and are more rural. Statistical analysis supports population as a significant variable.

Table 3

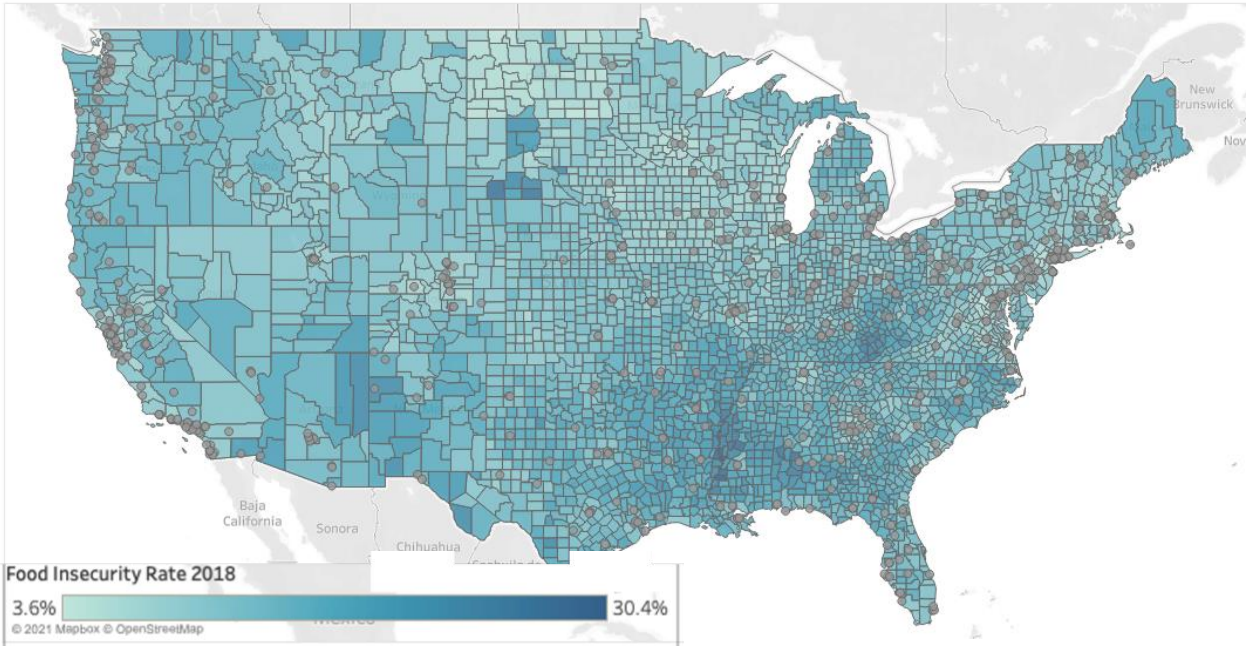
RUCC	Definition
1	Metro - Counties in metro areas of 1 million population or more
2	Metro - Counties in metro areas of 250,000 to 1 million population
3	Metro - Counties in metro areas of fewer than 250,000 population
4	Nonmetro - Urban population of 20,000 or more, adjacent to a metro area
5	Nonmetro - Urban population of 20,000 or more, not adjacent to a metro area
6	Nonmetro - Urban population of 2,500 to 19,999, adjacent to a metro area
7	Nonmetro - Urban population of 2,500 to 19,999, not adjacent to a metro area
8	Nonmetro - Completely rural or less than 2,500 urban population, adjacent to a metro area
9	Nonmetro - Completely rural or less than 2,500 urban population, not adjacent to a metro area

The literature review revealed a strong focus on food rescue in urban areas which peaked interest in understanding the presence of FROs in rural areas. 83% of counties with FROs are in urban centers. One study suggests network effects and density help FROs thrive[xlvi] which could explain why there are fewer FROs in rural areas. Additionally, urban centers may have a higher density of restaurants, convenience stores, or grocery stores that are large food generators and contributors to FROs. Further analysis regarding the presence of food generators could provide an additional level of detail and distinction within urban centers.

Demographic factors

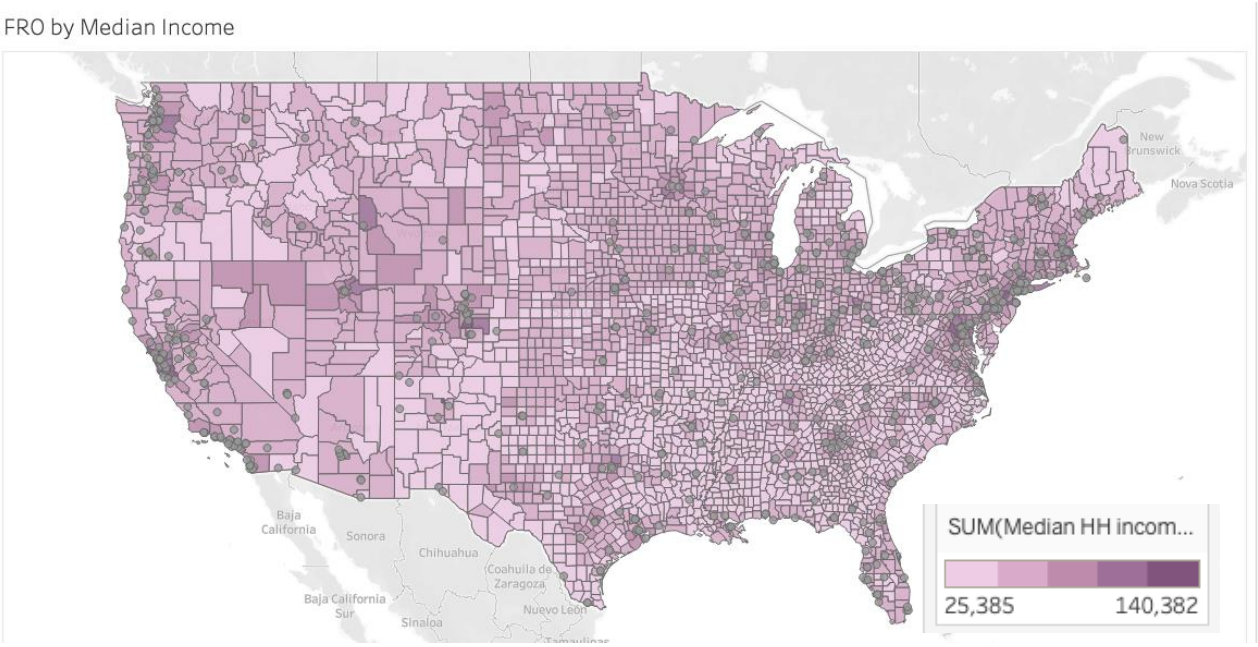
In addition to population and metropolitan status, geospatial analysis also included overlaying FROs with food insecurity rate by county. Lighter counties have lower rates of food insecurity. Counties with FROs had a food insecurity rate of 12.2% on average. This is lower than counties without which had a 13.3% food insecurity rate. The difference in childhood food insecurity rates is even larger – 17.0% childhood food insecurity rate in counties with FROs and 19.4% in counties without FROs.

Food insecurity rate and FROs



This second graph shows median income by county overlaid with FROs. Counties with FROs have a higher median income - $61,451 – than counties without - $51,528. This is largely influenced by the urban nature of counties with FROs. Similarly, counties with FRO experience larger charitable giving per taxpayer - $13.17 versus $11.08.

FRO by Median Income



Statistical analysis

The regression analysis also reviewed other demographic and socioeconomic factors that may influence the presence of FROs such as unemployment, poverty level, race, and age.

Table 4

Influence of demographic, socioeconomic, and policy factors on the presence of FROs

Model summary

Number of observations	R-squared	Root MSE**
3139	0.316	0.27737

Factors	Coefficient	Robust standard error	t	95% confidence interval Lower bound	Upper bound
Unemployment rate*	-0.0154813	0.0063299	-2.45	-0.0282017	-0.0027609
% of population in poverty	0.001023	0.0024993	0.41	-0.0039996	0.0060456
% of population under 19 years old*	-0.0057717	0.0017217	-3.35	-0.0092316	-0.0023117
% of population above 65 years old	0.0015637	0.0019326	0.81	-0.0023201	0.0054475
% of population that identifies as white*	-0.0030104	0.0009436	-3.19	-0.0049067	-0.0011141
Percent of population that identifies as black*	-0.0019368	0.0009604	-2.02	-0.0038668	-6.87E-06
Percent of population that identifies as Hispanic*	0.0014673	0.0003876	3.79	0.0006885	0.0022462
Population*	0.1179506	0.0090296	13.06	0.0998048	0.1360963
Median income	0.025847	0.0742879	0.35	-0.1234402	0.1751342
Charitable giving per taxpayer*	-0.043563	0.013332	-3.27	-0.0703547	-0.0167713
Expanded liability protection when final recipient pays	0.0254218	0.0186692	1.36	-0.0120953	0.0629389
Expanded liability protection when donating directly to final recipients	-0.0033203	0.0228553	-0.15	-0.0492497	0.042609
Expanded liability protection when limited labeling is required*	0.2243644	0.0534386	4.2	0.1169754	0.3317534
Expanded liability protection when donating past-date food*	0.0794353	0.0357894	2.22	0.0075137	0.1513568
Expanded tax incentives	0.0070431	0.0217227	0.32	-0.0366103	0.0506965
Constant	-0.8615724	0.8877988	-0.97	-2.645671	0.922526

*Significant at p=0.05
*Standard error adjusted for clustering

The regression analysis shows a positive correlation between the probability of the presence of a FRO and percent of population in poverty, percent of population that identifies as Hispanic, median income, and the population of the county. There is a negative correlation between the probability of the presence of a FRO and populations under 19, populations that are largely white or Black and those experiencing unemployment. Of these factors, only factors relating to unemployment rate, percent of population under 19 years old, percent of population that identifies as white or Hispanic, and charitable giving are statistically significant.

The most significant demographic factor is the log transformation of population. The analysis also considered the importance of whether a county is urban or not compared to the population factor. The population factor played a greater impact in significance than whether a county was urban or not. The urban factor was not included given it is also influenced by population.

As previously mentioned, counties with FROs have statistically lower levels of food insecurity than counties without FROs according to a t-test analysis. This factor could not be used in the regression because FROs also influence food security. The relationship between food insecurity rates and FROs is an area for further study, particularly looking at census tract data in more urban, densely populated areas like New York City.

The factors below have been shown to be statistically significant in comparison with counties without FROs.

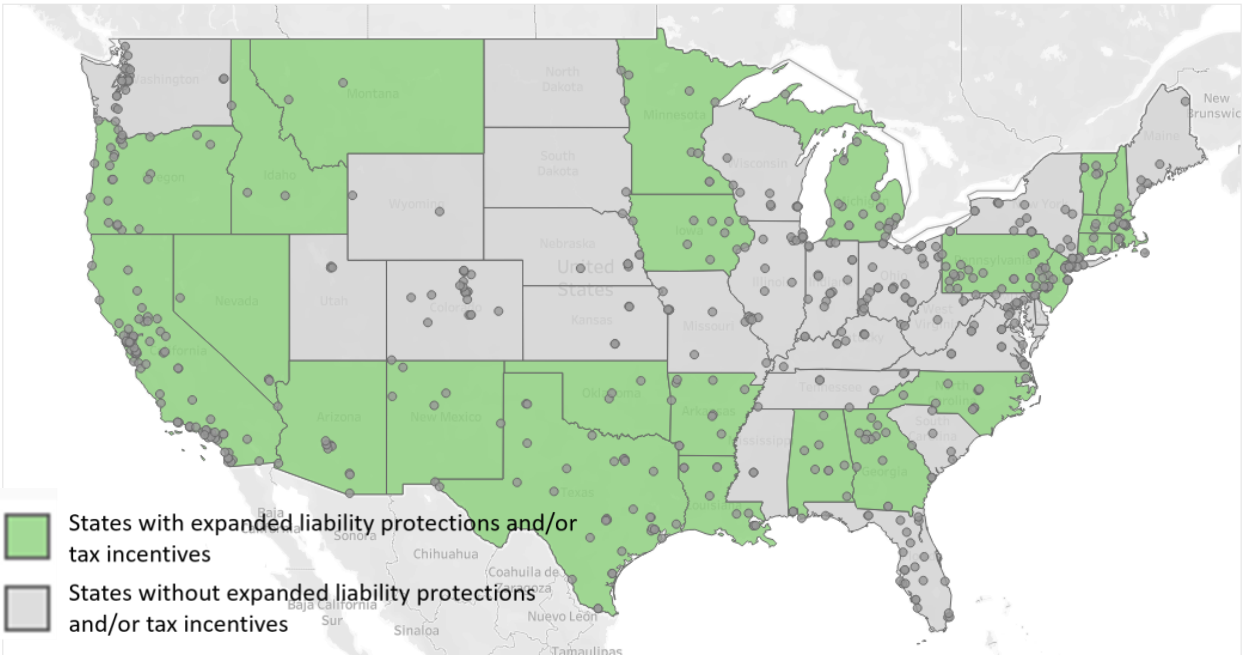
State and Federal Policy

What policies influence the presence of FROs?

Summary: *Expanded liability protections that support limited labeling requirements and donations of food past the expiration date both emerged as statistically significant factors influencing the presence of FROs. Donating food directly to end recipients, when end recipients pay for donated food, and tax incentives were not statistically significant factors, however, they may provide greater benefits to food donors and the amount of food donated in total.*

States have introduced expanded liability protections and tax incentives at the state-level to complement federal liability protections and tax incentives. These new laws can be tailored to state-level needs and industry sectors. 24 states have expanded liability protections and nine states have tax incentives. Four states have both. The map below shows the overlay of where food rescues exist with states with expanded liability protections or tax incentives.

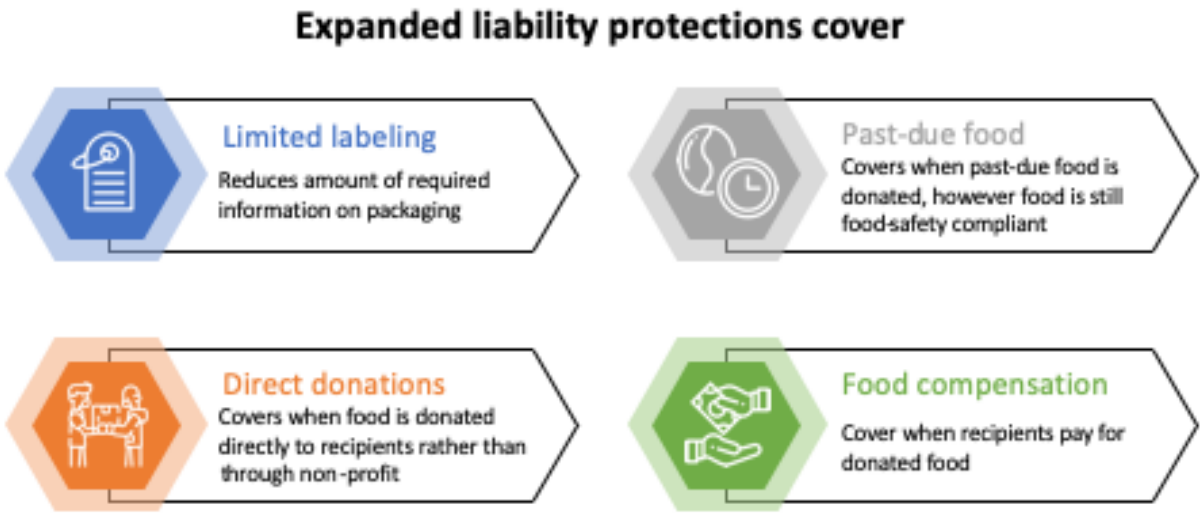
Policy landscape



Expanded liability protections

ReFED has divided expanded liability protections into four categories:

1. Protection regardless of compliance with non-safety related labeling requirements (limited labeling requirements)
2. Protection for the donation of past-date food
3. Protection for food service establishments and retail stores donating directly to final recipients
4. Protections apply when end recipient pays for the donated food (food compensation)



Regression analysis

Policy variables were coded as binary variables and included these four categories, two variables for all expanded liabilities and all expanded tax incentives, and a final binary variable identifying the presence of expanded liabilities or expanded tax incentives.

From the table below, policy factors alone are not strongly determinant of the probability of the presence of FROs.

Table 5

Influence of policy factors on the presence of FROs

Model summary

Number of observations	R-squared	Root MSE**
3142	0.0536	0.32595

Factors	Coefficient	Robust standard error	t	95% confidence interval Lower bound	Upper bound
Expanded liability protection when final recipient pays	0.0259154	0.0265239	0.98	-0.0273595	0.0791902
Expanded liability protection when donating directly to final recipients	0.0253634	0.035248	0.72	-0.0454342	0.0961611
Expanded liability protection when limited labeling is required*	0.3931574	0.0734706	5.35	0.2455874	0.5407273
Expanded liability protection when donating past-date food*	0.3470457	0.0386889	8.97	0.2693367	0.4247547
Expanded tax incentives	0.0014957	0.022977	0.07	-0.0446549	0.0476463
Constant	0.1016755	0.019755	5.15	0.0619965	0.1413545

*Significant at p=0.05

**Standard error adjusted for clustering

However, from the regression analysis, two of the four policies seem to have a stronger relevance in increasing the probability of the presence of FRO. Limited labeling requirements and donating past-date food have the most significant impact of all the policy factors and are also statistically significant. The presence of laws allowing limited labeling requirements and donating past-date food are correlated with an increase in the probability of the presence of a FRO on a statewide basis by 22.4 percentage points and 7.9 percentage points, respectively.

Table 6

Influence of demographic, socioeconomic, and policy factors on the presence of FROs

Model summary

Number of observations	R-squared	Root MSE**
3139	0.316	0.27737

Factors	Coefficient	Robust standard error	t	95% confidence interval Lower bound	Upper bound
Unemployment rate*	-0.0154813	0.0063299	-2.45	-0.0282017	-0.0027609
% of population in poverty	0.001023	0.0024993	0.41	-0.0039996	0.0060456

% of population under 19 years old*	-0.0057717	0.0017217	-3.35	-0.0092316	-0.0023117
% of population above 65 years old	0.0015637	0.0019326	0.81	-0.0023201	0.0054475
% of population that identifies as white*	-0.0030104	0.0009436	-3.19	-0.0049067	-0.0011141
Percent of population that identifies as black*	-0.0019368	0.0009604	-2.02	-0.0038668	-6.87E-06
Percent of population that identifies as Hispanic*	0.0014673	0.0003876	3.79	0.0006885	0.0022462
Population*	0.1179506	0.0090296	13.06	0.0998048	0.1360963
Median income	0.025847	0.0742879	0.35	-0.1234402	0.1751342
Charitable giving per taxpayer*	-0.043563	0.013332	-3.27	-0.0703547	-0.0167713
Expanded liability protection when final recipient pays	0.0254218	0.0186692	1.36	-0.0120953	0.0629389
Expanded liability protection when donating directly to final recipients	-0.0033203	0.0228553	-0.15	-0.0492497	0.042609
Expanded liability protection when limited labeling is required*	0.2243644	0.0534386	4.2	0.1169754	0.3317534
Expanded liability protection when donating past-date food*	0.0794353	0.0357894	2.22	0.0075137	0.1513568
Expanded tax incentives	0.0070431	0.0217227	0.32	-0.0366103	0.0506965
Constant	-0.8615724	0.8877988	-0.97	-2.645671	0.922526

*Significant at p=0.05
*Standard error adjusted for clustering

When leveraging combined variables, like those for expanded liability protection, expanded tax incentives, and the combination of these, the significance of the model decreases compared to when all four liability variables are articulated. Expanded tax incentives are uniquely adapted by state and not as easily grouped which explains why there is only one variable for tax incentives. Other policies like waste bans and targeted funding that support food rescue outside of those mentioned here may apply to certain states and influence these findings.

Limited labeling and donating past-date food policies

Limited labeling requirements refers to laws that reduce the amount of labeling needed for food to be donated. This reduces necessary labeling needed to information most relevant to food safety – for example, types of ingredients, etc. According to the main regression, the presence of a limited labeling law increases the probability of the presence of a FRO by 22.4 percentage points. This is a significant impact and is largely influenced by California. California is a large state with over 39.5 million people[xlvii] and 58 counties. 34 of these counties have FROs – 59% of all counties. This is the largest proportion of counties with FROs of any state. Limited labeling requirements are also present in Nevada and Oregon.

Laws that allow food to be donated past the best-by or sell-by date are correlated with an increase in the probability of the presence of a FRO by 7.9 percentage points. These dates are not a measure of food safety, and food can be safely consumed after these dates. Massachusetts is the only state to have this policy.

Policies regarding paying for donated food and donating directly to end recipients

Two other policies that expand liability protections related to when end recipients pay for donated food or when food is donated directly to end recipients from a food source (instead of via a nonprofit) also play an important role in the food donation landscape.

Another type of expanded liability protection is for when the end recipient pays for the donated food. The national Bill Emerson law only covers when food is donated for free, but this allows for non-profits to recoup some costs like transportation and operate more sustainably. According to the main regression, the presence of an expanded liability protection is correlated with an increase in the probability of a FRO by 2.5 percentage points. However, this finding is not statistically significant. This is the most prevalent type of expanded liability protection and is available in 18 different states.

Similarly, donating food directly to end recipients is another expanded liability protection in states such as Arizona, Minnesota, and Vermont. In the federal Bill Emerson Act, food donors must donate food to a non-profit in order to receive protections. However, donating food directly can allow for a wider distribution of foods and create avenues for food donors to connect more directly with communities, increasing impact. This metric tends to have a small negative correlation with the presence of FROs, but it is not statistically significant. However, this negative correlation can be explained by the nature of the protection. By donating directly to food recipients, this protection may reduce the need for FROs. This protection is available in Arizona, New Mexico, Louisiana, Minnesota, New Hampshire, Vermont, and Massachusetts. In these states, 10-50% of counties have FROs.

Tax incentives

Tax incentives are another type of policy that states employ to support food donations. These expanded state-level tax incentives support food donors who can leverage tax deductions or tax credits to offset losses from food donations. These vary greatly by state and like expanded liability protections can be tailored to state industries and needs. In the main regression, tax incentives played a minor role and are correlated with an increase of the probability of the presence of a FRO by .7 percentage points. This finding, however, is not statistically significant, as shown above. Tax incentives are not designed to benefit FROs; therefore, it is not surprising or concerning that this policy does not impact the presence of FROs. It would be more relevant to test if this tax incentive has increased the amount of food donated.

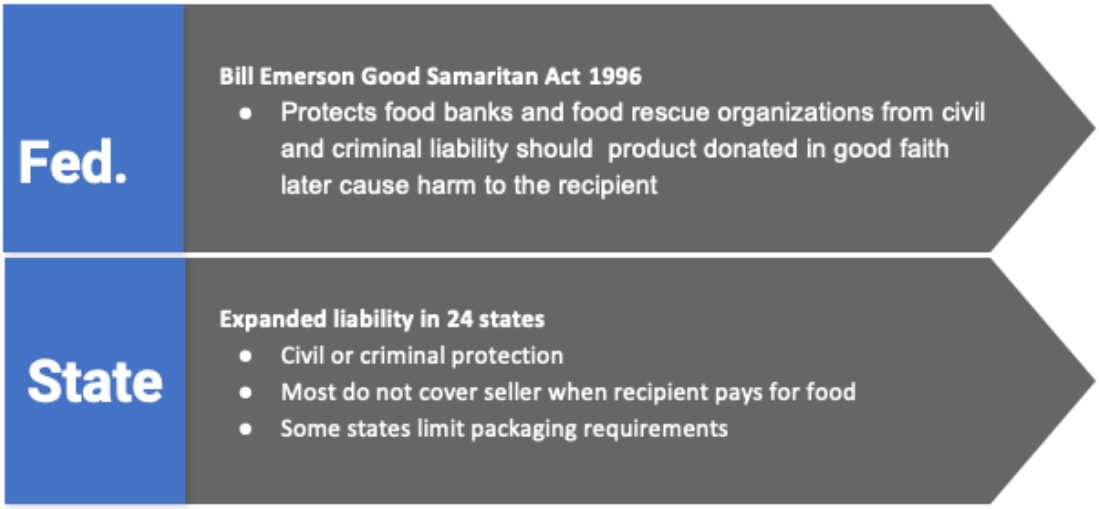
It is also important to note that these policies described above might not always be directly related to supporting FROs. It does not mean that these policies are less valid or should not be supported. Future research projects or interests could consider how these policies support food donations and reducing food waste overall.

FROs' awareness of policies

Understanding and communicating these policies is key to their effectiveness. Non-profits and FROs often take lead on communicating these policies to food donors. The survey measured how aware non-profits are and how aware and/or concerned food donors are regarding liability protections and tax incentives.

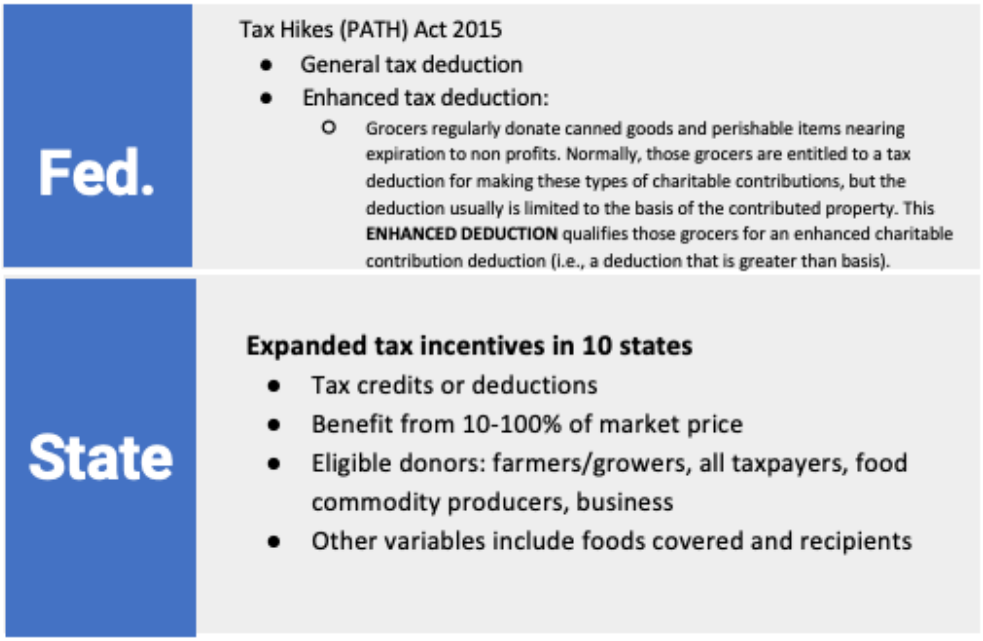
The following images were presented to respondents using a Likert scale to assess how aware they had been of these policies before viewing this image. Basing this question off of a uniform message was important because interviews had revealed liability protections could have different meanings to respondents.

Liability Protections



Source: ReFED - Food Waste Policy Finder

Tax Incentives



Source: ReFED - Food Waste Policy Finder

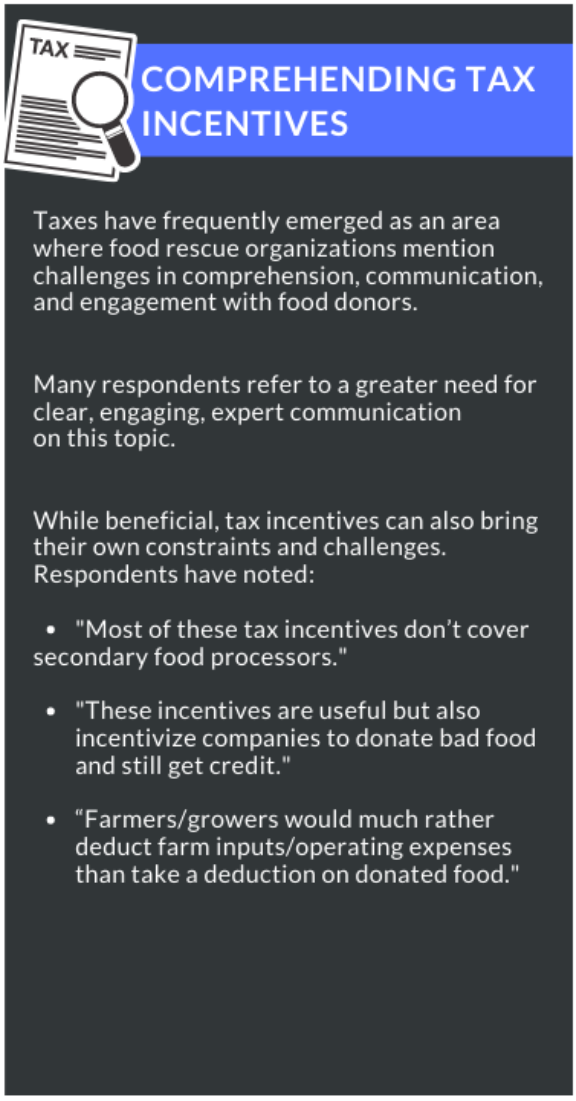
Of the respondents, 96% of respondents either somewhat or strongly agreed that they were aware of the policies. A few noted that they were familiar with the federal legislation but not the state-level expansions. Others mentioned that "vendors and donors do not know about these laws" and "if more people know about this, it would be better and easier to do food rescue." Other respondents noted more engaging presentation of this material would support awareness and understanding. They also noted that embedding this information with food safety rules would be helpful.

Understanding tax incentives

The respondents' comprehension of federal and state tax incentives was more varied than comprehension of liability protections. Only 57% of respondents stated they either somewhat or strongly agreed to understanding federal and state tax incentives. Taxes have frequently emerged as an area where FROs mention challenges in comprehension, communication, and engagement with food donors. Many respondents refer to a greater need for clear, engaging, expert communication on this topic.

Respondents identified key constraints and impacts of tax incentives. One respondent mentioned that "most of these tax incentives don't cover secondary food processors," and another respondent noted that "these incentives are useful but also incentivize companies to donate bad food and still get credit." Additionally, another respondent mentioned that in their area "farmers/growers would much rather deduct farm inputs/operating expenses than take a deduction on donated food." This further supports the notion that tailored state-level tax incentives to support a state's unique food economy and system can be beneficial.

This tax information needs to be clearly communicated through a series of players. Clear documentation of food rescued (and its cost basis) to both the food donor and the non-profit is critical information to support tax filing and communicate impact to philanthropic donors. Food donors have multiple stakeholders that take part in the food rescue process. A store-level manager or a store assistant may be permitting or organizing the transfer of food, however, they are often not the one managing taxes. Each store has or will develop its own processes to manage food rescue and the transfer of data, so it is imperative for nonprofits to understand who to communicate to and how to facilitate these processes, where possible.



As mentioned previously, non-profits are often some of the main communicators of this information. More than half (52.7%) of respondents noted that they provide resources on liability protections and tax incentives to food donors. Another 18% mentioned that they currently don't provide these resources, but they will or want to. Over 70% of respondents either are or will be responsible for communicating this information yet many mentioned that they need or would prefer more engaging resources on these topics. Media resources have emerged as a strong need to support FROs.

Waste bans and other policies

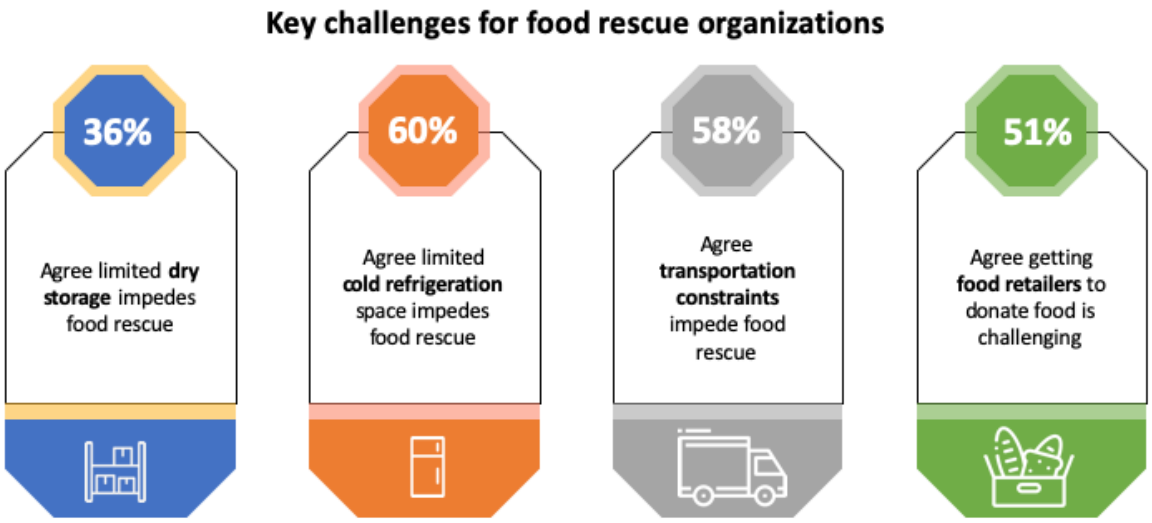
While waste bans were not been the focal point of this study, through interviews, waste bans continued to emerge as part of the solutions to support food rescue. Depending on the specifics of the waste ban, businesses of a certain size will have limits as to how much organic waste can be disposed to a landfill. Businesses are often left to find other avenues to dispose of waste and commonly consider composting, recycling, and food rescue. However, supportive infrastructure is key to the effectiveness of waste bans. Without this infrastructure, I.e. compost and recycling facilities, anaerobic digestors, funding and policies to support food rescue, any technology infrastructure, organic waste bans can create confusion and their success will be limited. FROs in this study noted that in order for waste bans to be effective for food donation, policies must be specifically framed to support food donation. Businesses may be likely to allocate all organic waste to composting, reducing opportunities for this food to make it to where it can be most helpful – food-insecure populations.

California's SB 1383 law on short-lived climate pollutants includes a mandate to recover at least 20% of edible food that is typically disposed of. This is the first law of its kind and California is already supporting the infrastructure to help make this a reality. California is also requiring data collection to measure progress and provide accountability to both food donors and food recipients. In order to support this, California's Department of Resources, Recycling, and Recovery, also known as CalRecycle, has provided multiple grants to Copia™ to help them become a leading service working with California businesses to realize this mandate. These grants subsidize the cost of 50 businesses joining their platform for approximately two years. The food rescue mandates will begin to go into effect in 2022, and Copia™ provides data tracking and management to ensure compliance.

Barriers to Food Rescue

What challenges do FROs face?

Summary: *FROs are constrained by a myriad of needs ranging from cold storage, more flexible contracts with food donors, and more engaging, accessible resources on liability protections and tax incentives.*



Physical infrastructure

Food rescue is inherently a game of logistics – how to connect food to where it can be most useful. This relies on transportation and storage. 14% of respondents strongly agreed that limited dry storage space kept them from increasing the amount of food rescued. Over twice the number of respondents, 36%, strongly agreed cold storage was an impediment to food rescue. Transportation was also critical – 26% strongly agreed that limited vehicles for transportation impeded the amount of food rescue. Cold storage is likely to be a bigger concern compared to dry storage given the perishable nature of most of the foods rescued.

Food donors

It is also important to understand how non-profits work with food donors. One of the greatest challenges with food donors noted was how pre-existing agreements to donate exclusively to one set of food banks made food donors refrain from forming new relationships. 30% of respondents strongly agreed and another 22% somewhat agreed that food donors refrained from donating food because of these pre-existing agreements. As noted above, most respondents were not part of Feeding America, a large network of food banks that has structured agreements with large companies. FROs in this study have expressed concern that food donors are unwilling to engage in new relationships, even when organizations that have contracts with food donors who are not able to fulfill their commitments. 24% of respondents strongly agreed that the extra effort and costs were factors that hindered food donors from donating food. 20% strongly agreed that concerns about legal liabilities kept food donors from donating. Interviews with FROs and technology platforms noted that communicating the Bill Emerson Act to donors is helpful, however, some food generators are also concerned with negative brand image, perhaps more than lawsuits, and are still unwilling to take the risk.

Food safety

Food safety was also a significant concern. 34% of respondents noted that food safety resources like thermal blankets, thermometers and/or refrigerators could help increase the amount of food rescued. Survey respondents also mentioned that more educational resources on food safety and specific state regulations could help compliance, especially for smaller organizations like food pantries.

Media resources
68% of survey respondents agreed that media resources that explain food safety, liability protection, and tax reporting could help increase the amount of food rescued. Clearly communicating liability protections and tax reporting can encourage stores and businesses to donate. Non-profits are also seeking to better understand food safety requirements and share this information with food businesses to support donations.

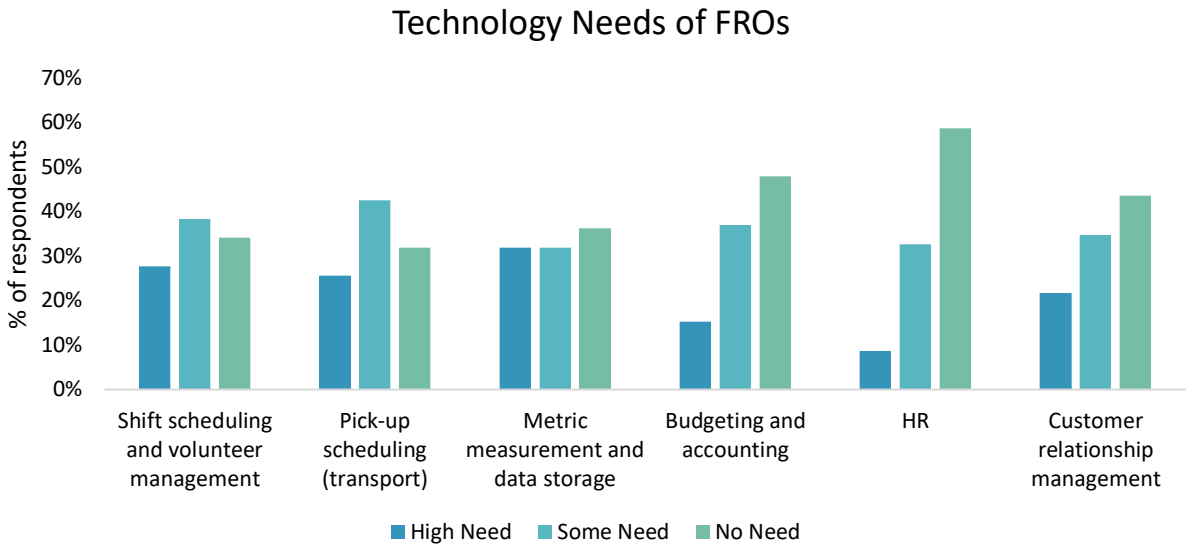
Technology

What types of technology platforms arebeing used to support food rescue?

Summary: *Organizations are using a mix of software to meet their current needs, including donation connection, customer relationship management, volunteer management, and standard word and numerical processing software. Popular software like Salesforce and Microsoft products are not specifically adapted to food rescue, although many FROs develop their own software internally to meet their needs.*

FROs are unique in their structure, food donor partners, size, and communities they serve, and thus their technology needs. A majority of organizations are developing their own software to help manage operations; however many were also using platforms that are not specifically adapted to food rescues, such as Salesforce and Microsoft Office products. The above word cloud highlights the most frequent types of technology used by food rescues surveyed. However, there are still remaining needs, as noted below. Adopting existing software can help allocate limited resources to other impactful areas.

Remaining technology needs of FROs are most concentrated in volunteer coordination, logistics, and measuring and tracking data.



Other key technology concerns include managing gleaning harvests and access to cloud and mobile technology.

Key technology applications

As mentioned previously, technology has the power to facilitate and scale food rescue by tackling the core issue of connecting excess food to where it is needed most and adding value through automated functions and data measurement. The conversations with technology platforms have helped further elucidate their value propositions, models, and how they support the food rescue landscape.

Fee for service vs. Free service

- Technology platforms require consistent maintenance and tech support to fix bugs. Platforms receive the funding for these needs from various forms. Some applications, like Replate and Copia™, rely on businesses to pay for pick-up. Reductions in waste hauling cost, tax incentives, goodwill, and other data can help encourage businesses to pay for this service, but some food generators like grocery stores are used to receiving this service for free and may be less likely to subscribe to this service. Fee for service models seem to be more regularly employed with prepared food services compared to packaged food or produce like those in grocery stores. However, in California, it is likely that the SB1383 mandate for food rescue may make businesses more willing to pay for this type of service.
- Other applications, such as ChowMatch and Food Rescue Hero rely on sponsorship from nonprofits. Nonprofits can pay for either the generic application with monthly fees or pay for a customized application at an increased price tag. Nonprofits who sponsor these applications may already have a substantial volunteer base they need to mobilize or an extensive network of donors to work with.
- Some platforms may be free for both parties and may be funded via other means – philanthropy, municipality, etc.

Volunteer-driven vs. Paid driver

- Transporting food is one of the main challenges in food rescue. Who is moving the food and how? Some platforms like Copia™ and Replate rely on different formats of using paid contractors to deliver food while ChowMatch allows nonprofits to determine whether volunteers or staff pick up food. Food Rescue Hero relies on community volunteers. Paid drivers are more consistent because they can be contracted to deliver food during a certain period repeatedly over time. They may have access to different size cars for different amounts of recoverable food.
- Volunteers are incredibly helpful for resource-strapped organizations, however, they might not always be able to complete tasks given prior commitments and turnover can be high. This can impact the sustainability of food rescue, however, with a large enough volunteer force, this can be overcome. Platforms like Food Rescue Hero, who rely on volunteers, have rescued over 30 million pounds of food.
- Volunteer-driven platforms may work well for dense, urban areas where you have a higher volume of people who may be able to contribute. Paid drivers can be effective in supporting food rescue in suburban or more rural areas where volunteers may be less available to drive longer distances

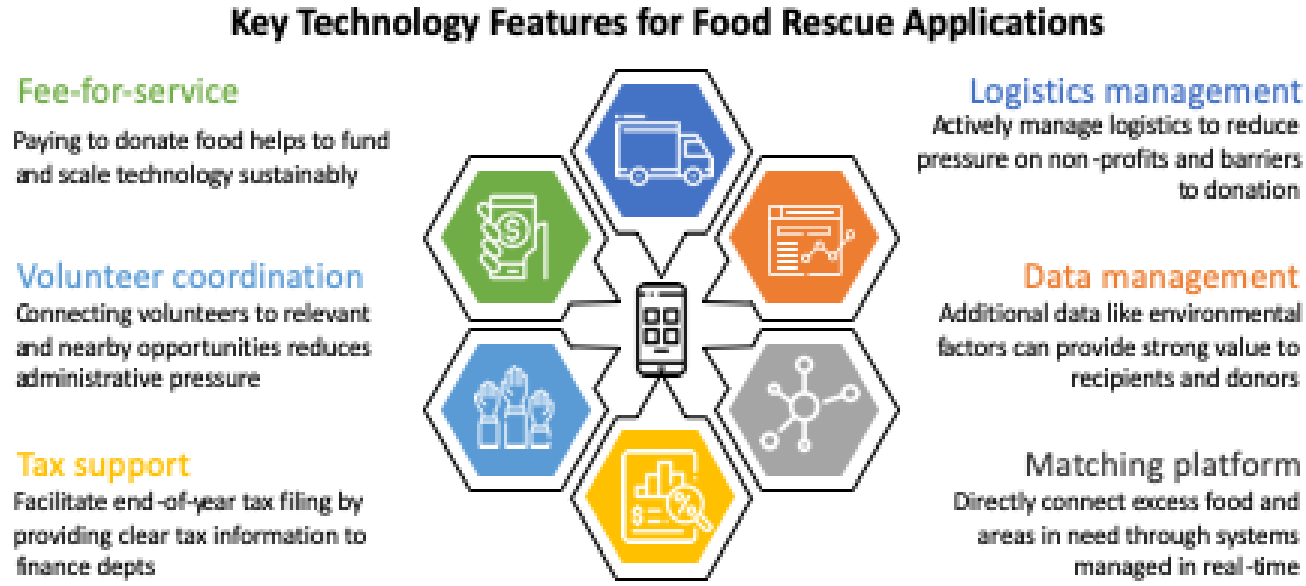
Reporting

- There are over 133 billion pounds of food wasted each year[xlviii], according to the USDA, with astonishing implications for CO2 and the environment. Tracking and reporting this data can be helpful for nonprofits, food generators, and even municipalities. Different platforms provide various types of reporting -impact reports, general measurements, tax reporting information, environmental impacts.

Spectrum of matching & algorithm use

- Platforms also vary in how involved they get in connecting excess food and needs. Copia™ provides automatic matching and dispatching of drivers. Other platforms alert all available nonprofits and let the first respondent complete the pick-up. Some provide matching but allow the nonprofits to decide whether to accept or not.

An analysis of these technology platforms reveals key features that are effective in supporting food rescue. Supporting technology platforms that have shown ability to scale quickly and broadly will be key, however, most technology seems to require some form of sponsor or champion to help applications move to new cities or areas. Survey respondents also noted high need for volunteer coordination, logistical support, and data management. Applications that reduce resource strain on nonprofits can help them concentrate in areas where they can add maximum value.



Details on technology applications

FarmLink is unique in the food rescue space in that they tackle large-scale transfers of produce from farms to food banks, increasing nutrition availability. They have scaled quickly and efficiently, identifying areas of high need and capacity to assign deliveries. The organization supports the economic volatility caused by the pandemic by paying drivers and farms allowing them to continue operating and reducing unemployment. Early on, they partnered with UberFreight to transport goods and have used other logistical companies to transport food. FarmLink's quick scale to 43 states shows the strong need for this type of service that is likely to exist after the pandemic winds down. Gleaning operations that harvest unpicked food from harvest may strongly benefit from partnering with this organization.

Copia™ stands out as a scalable for-profit company managing logistics and data to facilitate food rescue and help food donors reduce waste. Their goal of reduction and prevention of food waste is largely based on their ability to manage, analyze, and provide data to help better decision-making to streamline future waste. Their scope is generally within commercial kitchens. In addition to grocery stores, this includes hospitals, schools, and other facilities that prepare food via commercial kitchens. Food donation champions help spur Copia™'s introduction into an area. From there, they build networks of recipients to donate food and coordinate through rideshare companies like DoorDash and Postmates as well as other logistical companies to deliver the food reducing the pressure and barriers from both nonprofits and donors. Findings from this study notes that transportation is a huge issue for nonprofits and donors alike as well as storage. By matching excess food, needs, and capacities through their real-time system, they help get food where it can be best utilized.

Copia™'s value has been recognized in the state of California through the provision of three grants through CalRecycle that are subsidizing Copia™'s cost for 50 businesses for the next two years approximately. California, as a trailblazer in many initiatives related to waste reduction and climate

change is planning to implement SB 1383 which mandates recovering a minimum of 20% of edible food that would be disposed of by 2025. Copia™ is helping businesses become compliant by not only helping to transport excess food but measuring and reporting on waste, edible, and inedible food. Copia™ is already in 300 cities and rural/suburban areas, has partnerships with chain restaurants with over 200 locations, and has the capacity to scale nationwide. Currently, Copia™ has been active in supporting restaurants during the pandemic to help keep people employed and provide food to food-insecure populations. They are also working with World Central Kitchen to deliver meals to food-insecure homes from the Great Plates Delivered program[xlix].

Food Rescue Alliance's Food Rescue Robot version 2.0 is set to be the new and improved version of the highly valued app. Survey responses revealed most FROs develop their own software, meaning that valuable resources across FROs are going into new software development versus scaling effective existing software. FRA took a holistic, inclusive, and community driven approach to develop this software – holding focus groups with member organizations over the course of the year to develop a flexible and adaptive software that is sure to support a wide-ranging set of organizational needs.

Food Rescue Hero is one of the only apps in this space that stems directly from a FRO, 412 Food Rescue. This app helps FROs manage weekly rescues and find volunteers. When donated food becomes available, nearby FROs will get a ping and can either choose to accept or reject. Then nearby volunteers are notified about the potential pick up. Food is usually picked up in an hour. Through its connection with 412 Food Rescue, Food Rescue Hero has access to a kitchen where they can turn rescued food into meals. Food Rescue Hero identifies forward-looking nonprofits to partner with to help scale the app to other cities. The organization can build an app tailored for each sponsoring non-profit or nonprofits can pay a monthly fee to operate on the shared platform. It is available in six cities and is hoping to expand to 10 by 2030. However, Food Rescue Hero has been able to make incredible impact in the cities where it is present; the organization has rescued 35 million pounds as of October 2020. They are hoping to expand to home delivery soon. During the pandemic, Food Rescue Hero has distributed food boxes as part of TEFAP – a COVID-19 assistance program.

ChowMatch is one of the more extensive and earlier platforms, having started in 2013 and reaching over 700 cities across at least four states. Their algorithm matches potential recipients with donors based on what they want to donate and how much. Once a donation is made available on the platform, a notification goes out to the non-profit and they send someone to pick it up. This can be either staff or volunteers depending on the structure of the receiving organization. The software also provides tracking and reporting information. Currently, nonprofits will sponsor the technology through a subscription service with the option for customization. While currently, most recipients do not charge, this may change, especially with SB1383 in California growing – where ChowMatch has a significant presence. ChowMatch recipients are able to rescue about 30 million pounds annually.

Replate has a model similar to Copia™'s model. Replate is quick and easy to use with the ability to sign up and receive/provide a donation on the same day. Donors can track donations across various locations, measure environmental impact, and schedule pick-ups on the platform's dashboard. They

have been able to pivot quickly in the wake of COVID-19 moving from prepared surplus food from restaurants and catered tech company events to targeting grocery stores and produce food markets. Their “Food Rescuers” who are responsible for transporting the food are paid contractors who are providing food to a variety of nonprofits. Replate works with the traditional soup kitchens and shelters but also works with job training programs that include food, providing an incentive for participation as well as reducing the stigma that might be associated with pantries and other food assistance programs.

Feeding America: Impacts and Constraints

In order to gain support or access to a network of retail food donors, many FROs join Feeding America’s network. The main incentive is access to retail food donors. Feeding America maintains local or national donation agreements with Kroger, Walmart, Safeway, and other food retailers. This streamlines donations to some extent for retailers, who may feel burdened by organizing food donation pickups with several different groups. The agreements also appear to increase barriers to procuring food donations for smaller FROs outside the Feeding America network. The survey assessed the relationship between FROs and Feeding America. Responses to survey questions about Feeding America are summarized below.

Why do FROs opt against affiliation with Feeding America?

- Lack of time, knowledge of Feeding America membership, or communication with Feeding America representatives
- Feel that Feeding America limits or inhibits food rescue mission in some capacity
- Does not perceive a mutually beneficial partnership due to difference in mission, organization, or model of food recovery.

What needs might Feeding America be able to meet?

- Develop resources relating to: inclusion of smaller food rescue orgs, fundraising for wages and cold storage space, and standardized retail partner food donation system
- Find a way to ease the burden created when Feeding America member food donors provide inedible food

KEY INSIGHTS GOVERNMENT FUNDING

"Our food recovery receives funding from USDA Community Food Project Grant and the NYS DEC Emergency Food Relief Grant."

"We receive support from the Mass DEP Sustainable Materials Recovery Grant Program and Mass DEP Organic Waste Ban."

"Pre-pandemic we received a small amount of reimbursement via the CACFP program. During the pandemic we have had access to USDA Farm to Families boxes and state National Guard members."

"We are supported by California's Department of Resources Recycling and Recovery (CalRecycle) We have received 3 EPA grants for food recovery. "

"Yes, many government resources for food rescue organizations exist, like EFAP, AmeriCorps, WSDA, and F2FP.

"Local government finances 1/4 of our operation and serves as a great advocate for our mission. State government could support our mission by improving farm tax credits and mandating food donation over waste."

"Our food rescue program was able to be established through a state grant."

KEY INSIGHTS FEEDING AMERICA

"We would like to see Feeding America partner grocers understand what our food rescue standards are. Having the time to sort through the food rescued (expired, inedible, etc) is a major burden. "

"We collaborate with our local feeding America food bank. However, Feeding America rules are too restrictive to serve our needs and their technology is not sufficient for what we do."

"Early on we sent an inquiry to see how we might become a member and received no response. Since we have not resubmitted an inquiry as there has been no shortage of work to be done."

- Improve guidelines on retail food rescue (liability explanations, navigating payment for donated foods, contact information for Feeding America member food donors)

Note that 50% of FROs surveyed report that food donors refrain from donating their food to them because the food donors have pre-existing agreements to donate exclusively to one network of food banks.

The research team hopes to be able connect to Feeding America to discuss these concerns in the future.

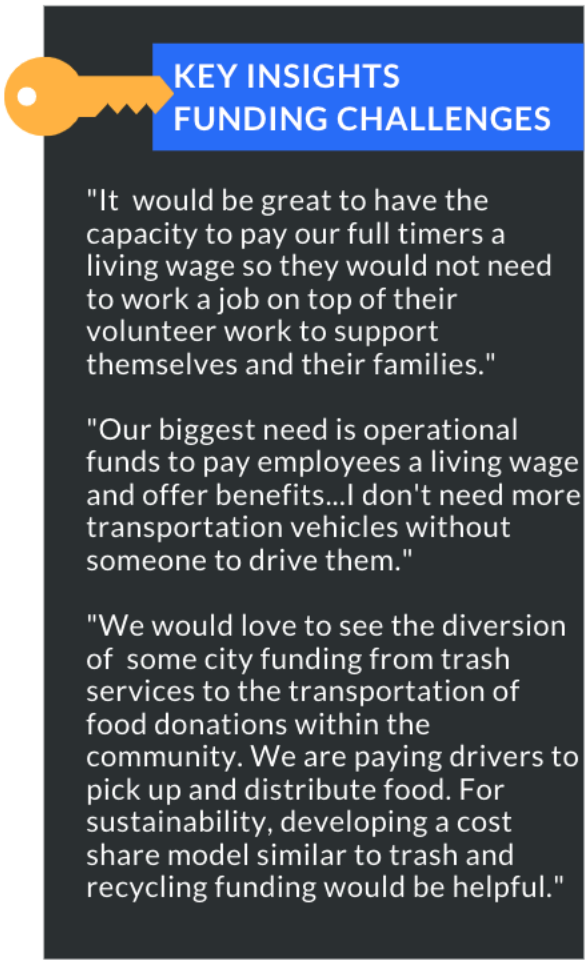
Themes from Open-Ended Survey Responses

Open-ended survey questions highlight partnerships with Feeding America, funding availability, and potential solutions that FROs believe could be impactful. Several trends in the responses provided the following insights.

- **Government Funding:** Over 40 write-in responses showed that many nonprofit FROs believe they are not eligible for government grants. Other responses suggest this is not the case. Over a dozen FROs report receiving government grants, which span funding from federal (USDA's EFAP, EPA) and state (NY's DEC, Washington's WSDA, Massachusetts's DEP) sources. Approximately 34.5% of FROs surveyed mentioned receiving some sort of county, state, or federal support through grants or partnerships.

- **Potential Solutions:** Respondents shared their ideas for potential solutions, including the diversion of trash system funding to food donation transportation, the standardization of food donation platforms for business, sharing cold storage with stores, and the creation of a peer resource sharing hub for FROs.

- **Educational materials:** Responses indicate that many FROs and retail food donors are not fully aware of their federal and state liability protections and tax incentives. Many respondents expressed a need for simple, intuitive, and in-depth resources to explain these concepts as they pertain to both FROs and food donors.



- **Systemic issues:** Food insecurity is caused by larger issues of poverty and at times food deserts. Challenging systems that create and perpetuate poverty eliminate the need for food rescue. One FRO mentioned, "Our gleaning program is meeting the need of food security and food rescue, we need the government to meet poverty at the source and create systemic change." Policies such as higher minimum wage and expanded healthcare are cited as beneficial policies by FROs to reduce poverty at the source.

- **Quality of food**: Food donors do not always sort the food before donating it, leaving that responsibility to FROs – stretching their already scarce resources. One food rescue articulated this sentiment with the following statement, “Vendors love to donate because it looks good for them and benefits them fiscally, but they don't care about the condition of the food they give us…They also don't care who picks up - as long as somebody takes it, which makes it easy for other food recovery orgs (who don't know any better) to stop by and take the food that we are scheduled to pick up.”

- **Working with food donors:** Working with food donors is paramount to make food rescue work and reduce food waste. The consistent turnover of staff and the variability of their schedules within grocery stores can make it difficult to create standard ways of working with FROs. One FRO mentioned “In terms of retail rescue, communication is also one of the most difficult aspects- we struggle to maintain communication with retail stores that have frequent staff changes.” A representative from a specialty food retailer noted tracking the amount of food donated can be challenging and reduce available tax incentives. Solutions should be socialized with both finance and operational teams to create cohesion. Organic waste bans can also spur businesses to find solutions, such as food rescue, to organic waste in order to avoid penalties.

- **Funding Challenges:** FROs report a high need for charitable giving in order to secure living wages for full time workers. FROs are also seeking solutions to fund the transportation of rescued food. One FRO submitted a proposal leverage local transportation infrastructure.

SURVEY INSIGHTS

EXCERPTS FROM OPEN ENDED QUESTIONS

GOVERNMENT FUNDS FOR FOOD RESCUE

"Our food recovery receives funding from (the brand new) USDA Community Food Project Grant and the NYS DEC Emergency Food Relief Grant."

"We receive support from the Mass DEP Sustainable Materials Recovery Grant Program and Mass DEP Organic Waste Ban."

"Pre-pandemic we received a small amount of reimbursement via the CACFP program. During the pandemic we have had access to USDA Farm to Families boxes and state National Guard members."

"We are supported by California's Department of Resources Recycling and Recovery (CalRecycle) We have received 3 EPA grants for food recovery. "

"Yes, many government resources for food rescue organizations exist, like EFAP, AmeriCorps, WSDA, and F2FP.

"Local government finances 1/4 of our operation and serves as a great advocate for our mission. State government could support our mission by improving farm tax credits and mandating food donation over waste."

"We collaborate with a City on a free grocery program. We could use more government support of small, local rescue efforts that are not tied to the Feeding America chain."

"Our food rescue program was able to be established through a state grant."

"We are primarily funded by our County. They are very supportive! We were recently awarded a contract of USDA Grocery Boxes to distribute to the community."

"We receive annual funding from our local Town and County Human Services."

FEEDING AMERICA

"We would like to see Feeding America partner grocers understand what our food rescue standards are. Having the time to sort through the food rescued (expired, inedible, etc) is a major burden. "

"We collaborate with our local feeding America food bank. However, Feeding America rules are too restrictive to serve our needs and their technology is not sufficient for what we do."

"Early on we sent an inquiry to see how we might become a member and received no response. Since we have not resubmitted an inquiry as there has been no shortage of work to be done."

FUNDING CHALLENGES

"It would be great to have the capacity to pay our full timers a living wage so they would not need to work a job on top of their volunteer work to support themselves and their families."

"Our biggest need is operational funds to pay employees a living wage and offer benefits...I don't need more transportation vehicles without someone to drive them."

"We would love to see the diversion of some city funding used to transport trash to support transportation of food rescue transportation costs. We are paying drivers to pick up and distribute food. For sustainability, developing a cost share model similar to trash and recycling funding would be helpful."

POTENTIAL SOLUTIONS

"It would be really helpful if each grocer industry created one system for rescue for all its stores. Instead each store manager creates how they want to do it so we must have a different system for each and every store."

"We would benefit greatly from designated staff members hired by each grocery location that are assigned the coordination of retail rescues and donation of near-date foods to mitigate any confusion around communication and responsibility."

"I feel like people in my area in the food rescue business don't work together... I would like to see a central gathering of info for all of us to tap into and help each-other do well. There is one resource group, FRA, sharing best practices across the nation."

"We have been fortunate to find local businesses willing to partner with us by allowing us to use a shelf in their cold storage. It took some time to find someone willing with the available resources but we pay nothing and are able to use existing resources rather than building them new."

POLICY

"Our organization was aware of the Bill Emerson act, but did not know anything about state liability coverage."

"have heard of the PATH Act but wasn't fully aware of it. These incentives are useful but also it does incentivize companies to donate bad food and still get credit."

"We were very familiar with Bill Emerson and liability protections. More helpful would be simple explanatory graphics or a searchable database with food safety rules on a state-by-state basis. "

"I would encourage the delivery of this (policy) information to be more engaging. Too often, it is displayed such that it is easy to skip and not care."

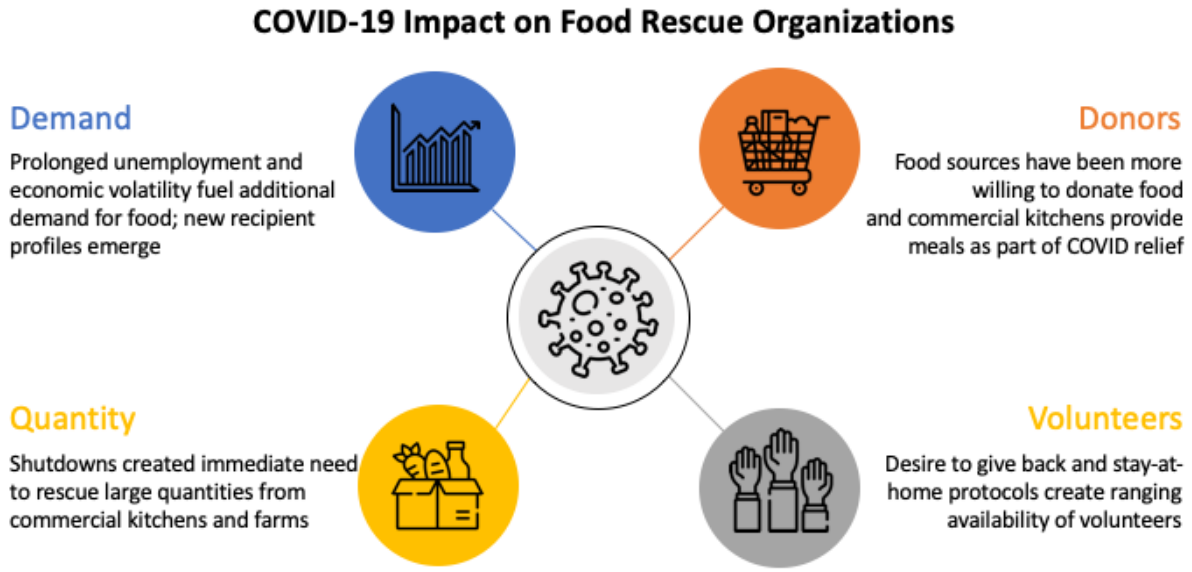
"We face challenges in existing food recovery laws (i.e. Good Samaritan act) in that we lose liability protection for our growers/donors if we sell the food or try and pay farmers for their donation."

"Many vendors/donors simply do not know about these laws. It would be helpful to have more clear resources on tax implications."

COVID-19

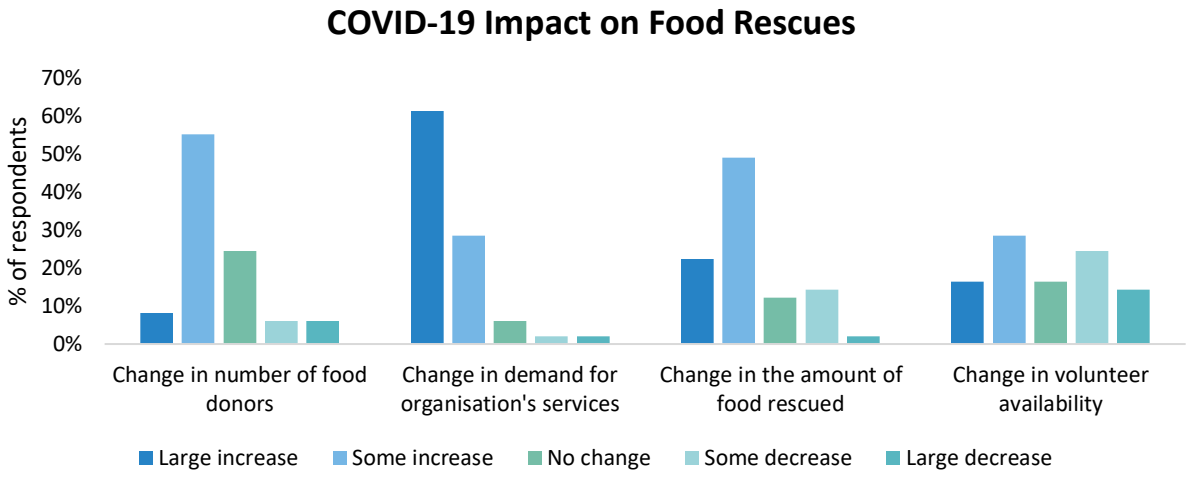
How has COVID-19 impacted FROs?

Summary: There have been *mixed and varied responses to the pandemic. FROs have had to navigate quick switches and adaptations, large orders and slow days, and challenging volunteer management while implementing new and stringent safety protocol.*



While COVID-19 was the catalyst for this research, it was not been the main focus of the information collected. The pandemic highlighted the need for this line of work (food rescue) to be supported, so data collection focused on how food rescues operate and their general issues with the objective of finding solutions that are not just adapted for the COVID-19 era but will support this industry for the future. Despite the scope of this study, it would be remiss to not dedicate part of this research to COVID-19 and its impact.

Disruptions in the supply chains have caused food sources to seek alternative locations for their food, increasing available donors. Persistent unemployment in low-income communities has increased demand as evidenced by increased SNAP registrations. The increased need for food given rising hunger and expanding poverty have also sparked food donations. Thankfully, food rescues have been able to adapt and increase food rescued even with variations in volunteer availability. However, like all aspects of the pandemic, this has not been a one size fits all response.



Survey results

Around 70% of food rescue respondents surveyed noted that they experienced either some or a large increase in food donors, and an even larger proportion experienced an increase in demand for their organization's services. 60% experienced a large increase in demand for services. However, volunteer availability had a more varied result given how stay-at-home policies and a desire to help more during the pandemic has changed volunteer make-up.

Sudden changes from a sudden shutdown

According to non-profits in Boston, New York City, and Palo Alto that were interviewed, COVID-19 has radically changed their food rescue plans. As cities implemented to shut down policies, schools and restaurants were forced to close, leaving foodservice providers and farmers with no supply chain to distribute their goods. Schools in Boston that had to close were suddenly met with an excess of food. Some universities allowed remaining students and staff to take home whatever excess food they could. They were able to donate most of the rest, but this resulted in large-scale donations all at once. This scale and short notice can be challenging for small non-profits to handle particularly given the challenges of storage and transport mentioned earlier. One university that had previously used student volunteers to package food for donations no longer had the volunteer force to rescue food effectively.

Social distancing implications on community-building

COVID-19 safety protocols involve mask-wearing and six-feet of distance, preferably contactless arrangements as much as possible. This has changed the community-building nature of food distribution that some food rescues rely on to provide additional services. For instance, one food rescue interviewed typically provides packaged meals in the lobby of an affordable housing unit. This encouraged residents to build relationships with administrators and provided a space and time where they could ask questions of each other and receive supportive services. Stay-at-home and social distancing policies encouraged this food rescue to reconfigure their distribution to adhere to these new guidelines, however this limited in-person interaction and community-building.

Changing visions and food sources

Some food rescues also needed to change their target donor once the pandemic hit. Rescuing Leftover Cuisine in Boston primarily targeted technology and professional service companies and recovered

catering food that had not been consumed. However, with the pandemic, these companies began working from home and no longer had catered lunches. Rescuing Leftover Cuisine now rescues food from grocery stores and other food businesses instead.

COVID-19 also pushed some food rescues to get started. Feed the Frontlines NYC began when the pandemic started and was an effort to utilize existing capacity at restaurants to feed frontline workers. After a few months, their mission expanded to utilize restaurants to provide meals for communities in need.

Solutions and partnerships

What solutions are FROs employing to solve pressing issues and scale reach and influence?

Summary: *FROs are resourceful and rely on relationships. In order to address some of their main needs, FROs have looked to partnerships to address resource gaps. However, they would also benefit from increased funding and targeted technology.*

FROs have been resourceful to address the challenges mentioned earlier. While funding is always welcome to support the procurement of trucks, drivers, storage, etc., these can also add more liabilities on to a non-profit's balance sheet. Volunteers are also a helpful and valuable resource; however, their availability and assistance are often variable and inconsistent. FROs have continued to look towards strategic, government, and industry partnerships to help meet needs, leverage excess capacity, and create stronger, more sustainable programs to rescue food.

Partnerships

A number of non-profits have pursued strategic partnerships to help fill these gaps. These partnerships can be with government agencies, other non-profits, or even for-profit organizations. Public-private partnerships allow companies to provide strategic support as a form of corporate social responsibility and brand-building. Leveraging the sharing economy can help optimize existing resources like cars and storage space and preserve scarce ones, like time and funding. For instance, Replate, a food recovery organization in Berkeley, CA, partnered with DoorDash via Project DASH to use DoorDash's logistics platform and their driver network to support food deliveries. This has sparked other partnerships such as those with Copia™ and 412 Food Rescue.

Eat Greater Des Moines on the other hand has built a partnership with a public government agency. The local Meals on Wheels chapter worked from the hours of 10am – 1pm most days to deliver food to the elderly. A representative from Eat Greater Des Moines connected with the organization to hire their drivers for an additional three hours to pick up and deliver food. This helps optimize drivers' time, provides them with more revenue, and increases reliability and ease of food transport with reduced upfront costs.

Government support

FROs can also benefit from partnerships at the government level that support the intersection of agricultural production, food safety, and environmental protections. In December 2020, the US EPA, FDA, and USDA renewed their formal agreement on the Cooperation and Coordination on Food Loss and Waste, of which food donation is included in one of the priority areas[l]. This has helped support the 2030 Food Waste and Loss champions which include major food generators and retailers like Amazon, Blue

Apron, Kellogg's, etc., who have pledged to reduce food loss and waste by 50% in their U.S. operations by 2030[li]. On a state-level, in Wyoming's 2011 Food Donation Policy, the Department of Agriculture encourages inspectors to "act as educators and consultants" to improve the safety of donated foods. This allows health inspectors to advocate for food donation and reduce concerns from potential donors on liability protections[lii]. Greater support from the state may help provide more encouragement to donors to participate in food donation. CalRecycle'spartnership with Copia™ is another example of how partnering with a government agency can help rescue more food and support FROs' mission.

Storage is also a critical need for organizations. Friendship Donation Network (FDN), a food rescue in Ithaca, NY, maintains a lean operation. They have one full-time staff member and yet manage to rescue between 400,000 and 500,000 lbs. of food annually. They coordinate with companies, volunteers, and non-profits to help connect excess food to where it can be most useful. FDN has coordinated with Greenstar, a local cooperative in Ithaca, to store food in a warehouse facility. Another FRO in upstate NY also faced the problem of storage. When faced with excess produce from a gleaning operation, they were able to connect with a local farmer to store the produce for a short amount of time before determining a means of distribution.

Implications for Wyoming

How can Wyoming support and expand food rescue?

Summary: *Wyoming currently does not have any expanded liability protections or tax incentives. The state can consider passing laws pertaining to these types of policies, especially those that encourage businesses to donate like waste bans and tax incentives. They can also facilitate education on food donation, provide grants to relevant organizations working in this space, and champion existing technology apps to help connect excess food to needs.*

71,000 Wyoming residents experience food security each year[liii] and food rescue can be key in reducing this statistic. While there are not currently any expanded liability protections or expanded tax incentives for food donation, the Wyoming Hunger Initiative (WHI) has taken the mantle in tackling these critical issues. This organization can play a critical role in reducing hunger through supporting food rescue and has already started to do this by gathering hunting donations through its Food from the Field initiative. WHI is covering any processing cost that is not support by a donation from the hunter. However, this can be further supported through a tax incentive that provides a tax credit to processing facilities, like the tax credit in South Carolina. Additionally, Colorado offers processors and businesses a 25% tax credit of wholesale price on livestock.

Supporting food rescues in the state of Wyoming

Wyoming may also want to support FROs in counties that this research has shown to have a higher likelihood of supporting FROs. The regression analysis provides values that demonstrate the probability of the presence of a FRO in each county. The table below shows five counties that have the highest probability of having a FRO (on a scale of 0 to 1) and if there are existing organizations in these counties. Note, the Wyoming Food Bank of the Rockies delivers food to all 23 counties in Wyoming, and this table might not capture smaller FROs in the counties listed.

County Name	FIPS County Code	Probability of FRO(0 to 1)	Existing FROs
Laramie County	56021	.2321	
Natrona County	56025	.1606	Wyoming Food Bank of the Rockies – Evansville, WY
Fremont County	56013	.1467	

Albany County	56001	.1448
Sweetwater County	56037	.1229

Limitations to this study

The scope of this work focused on policies supporting FROs. This study identified many challenges, policies, tools, and solutions that are impacting the world of FROs and the act of food rescue. However, time constraints limited the ability to pursue all avenues and opportunities within this scope of research. There are a few key perspectives that have not been explored fully. In an extended study, researchers could connect more with developers and operators of technology applications to understand their challenges in scaling and supporting food rescue. Targeted research with food donors to understand their perspective and challenges in donating food would also be a valuable line of study. There are also a number of other leading organizations in this space that were unable to be interviewed due to time constraints. Finally, this report was produced for organizations with a focus on developing recommendations for programs and policies in WY. Some recommendations will likely vary for organizations in other states.

Questions for further analysis

1. How are smaller FROs incorporated into the decision-making process at large organizations like Feeding America? How can data be more disaggregated to provide a clear understanding of who is rescuing and distributing food?
2. How do organic waste bans and the prevalence of composting areas support or hinder food rescue efforts?
3. What policies expand the amount of food donated? This is a different question than what supports the presence of FROs and can focus more on businesses and the source of food.
4. How effective are tax incentives? What restrictions are limiting? Which types most encourage food donation?
5. What is the impact of food donations or FROs on the demand for state or federal food hunger reduction programs? In other words, do high levels of food donation or the presence of a local FRO decrease costs for hunger reduction programs? If so, a stronger case could be made for the policies which support food donation outlined in this report.

Recommendations

These data-driven recommendations are actionable steps food rescue advocates can take to support, expand, or empower FROs.

Policy

1. Support policies that actively incentivize businesses to donate or penalize waste or not donating versus relying on goodwill.
    a. Expand liability protections nationwide
        i. Protections for donors when food is donated past the date on its label
        ii. Protections for donors when donated food has limited labeling
        iii. Protections for donors when end recipient pays for donated food
        iv. Protections for donors when donating food directly to recipients
        v. While this study has shown that the first two are correlated with a higher presence of FROs, all four can support FROs and food donations and should be included in any expansion efforts.
    b. Expand tax incentives for food donation in order to support FROs
        i. More research on the efficacy of tax incentives is imperative. However, present research and interviews show expansion of these incentives could support food donation. ReFED, a leading organization providing information and research on donating food, has conducted some research in this space. The organization estimates that expanding federal tax benefits to businesses and organizations that make donations via distribution strategies not currently covered under the current Good Samaritan Act would create $470 million annually in economic value and lead to the recovery of an additional 638 million meals[liv]. The food recovery landscape is becoming more complex as more innovative ways to produce and distribute food appear. The policy should be updated to accommodate these new approaches and further food rescue and donations.
2. Encourage states that have or are considering organic waste bans to include sections that encourage or mandate food rescue like SB1383 in California and provide the necessary funding to support any mandates.

Technology

1. Consider fee-for-service apps or models to more sustainably coordinate food rescue
2. Leverage donation technology platforms to provide necessary information for tax forms for donors when picking up food donations, where possible
3. Select technology models based on which approach may be best suited for local conditions

Partnership development

1. Encourage food rescues to partner with other organizations to fulfill unmet needs, including transportation and storage
    a. It can be led by the government as a mandate to meet with other departments to find solutions. Identify agencies involved in public health, environmental concerns, waste management to disseminate information.
        i. For instance, health inspectors can be a valuable resource in communicating food safety requirements and reducing liability concerns for food donors

    b. Can be supporting an app that pairs open resources (drivers, storage, etc.) with FROs
    c. Can be a partnership with local transit systems or other rideshare companies during low times of ridership
    a. Consider other innovative solutions adapted to the local context
2. Support food donors to create standard operating procedures to facilitate food rescue
    a. Measurement of scale, value, and cost of food rescued
    b. Facilitate the communication of relevant information (I.e., tax deduction/credit information)
3. Coordinate a meeting between FWRA, Feeding America, and Food Rescue Alliance to address the barriers for food rescue in large food generators and create implementable solutions. Specifically, these groups could leverage their influence to create a standardized food donation system in stores, rather than each store manager creating their own procedure.

Education

1. Support networks of FROs to create a media hub for resources which inform FROs and retail food donors on the relevant policies, procedures, and information identified by survey respondents as high value.
    a. Consider engaging relevant government agencies to help build and/or distribute materials that explain food donation liability and tax incentives for businesses
2. Encourage the development of tax reporting "how-to" resources for FRO to give their food donors. These resources should be highly interactive, simple, and easily sharable.
    a. FROs can leverage applications that facilitate logistics and provide necessary tax information (I.e., Copia™, RePlate) for best practices on the tax process
    a. These should be developed in consultation with a tax professional familiar with the legislation.

Wyoming – focused recommendations

1. Support expanded liability protections and tax incentives for food donations.
    a. Liability Protection**:** Expand Wyo. Stat. Ann. § 35-7-1301 to include not only civil (current status) but also criminal protections for food donors. Expand protections to include direct donations from retail to food-insecure folks, and include protections in cases when the end recipient pays for donated food.
    b. Tax Incentives: Model a tax credit based on S.C. Code Ann. § 12-6- 3750, which provides a $75 tax credit in South Carolina for a donation of carcasses from licensed meat processors. Also, create a tax incentive giving farmers and retailers between 10-100% of the wholesale market price for donated food items.
2. Support the development of food rescue in counties shown to have the most potential for FROs - Laramie, Natrona, Fremont, Albany, and Sweetwater County.
    a. Identify key towns and cities in these areas
    b. Promote or encourage connections between different organizations that can support food rescue
        i. Organizations with storage capacity, excess transportation capacity
        ii. Food donors
        iii. Relevant government agencies
    c. Identify and support potential leaders from these communities to champion food rescue efforts

d. Connect with Wyoming Hunger Initiative to support this development and leverage relationships with food donors
e. Encourage the use of technology to help these FROs scale

RECOMMENDATIONS

Food Rescue Pathways

1. Policy

1.1 Liability Protections
Expand state and federal liability protections for food donors and food donation recipients.

1.2 Tax Incentives
Create or expand tax incentives granting tax benefits to food donors tailored to needs of state agriculture and food system

1.3 Food Waste Bans
Encourage states with or considering organic waste bans to include sections that encourage or mandate food rescue like SB1383 in California and provide necessary funding to support any mandates.

2. Technology

2.1 Fee-for-service approach
Consider fee-for-service applications or models to more sustainable coordinate food rescue Fees can be positioned as waste reduction costs for donors

2.2 Support tax filings
Leverage donation technology platforms to provide necessary information for tax forms for donors, where possible

3. Partnership Developement

3.1 Government Partnerships
FROs ought to seek partnerships with government organizations to fulfill unmet needs, including transportation, storage, funding, and educational resources about food donation.

3.2 Industry Partnerships
To find implementable solutions to food rescue barriers, increase collaboration between FROs and leading groups with aligning interests (including FRA, SA, FWRA, and FA).

4. Education

4.1 FRO Media Hub
Support FRO networks in the development of a media hub to house resources informing and empowering FROs and retail food donors with knowledge of topics identified as high value in the survey.

4.2 Media Resource Development
Create media resources in the form of videos, podcasts, interactive web tools, or other media content to promote self-guided learning among FROs. This media content ought to be based on the education needs expressed by FROs, including information on liability protections, tax incentives, tax reporting processes, government funding sources for FROs, FRO technology options, food safety, and food date labeling.

Conclusion

Food rescue plays a critical role to both reduce food waste and reduce food insecurity. With over 133 billion pounds of food wasted every year and XX people that go hungry, it is clear there is still ample room for food rescue to grow. While there are policies in place to support food donation like liability protections and tax deductions, FROs still face difficulty in engaging food donors and further difficulty in managing logistics to get food to where it can be most useful. FROs manage to overcome some of these needs with partnerships and technology. However, expanded liability protections and tax incentives at a state and national level can further encourage food donors and support the objective of rescuing and recovering food. More important will be to effectively communicate existing laws to relevant food donors as many still remain unaware when approaching opportunities to donate.

The data-driven recommendations in this report are intended to encourage legislators to enact expanded liability protections and tax incentives and to find solutions and ideas to support FROs in their mission to reduce food waste and food insecurity. Through collaboration, advocacy, and engagement, food rescue can be scaled to reduce both food waste and insecurity.

References

[i] International efforts on wasted Food Recovery. (2020, October 22). Retrieved February 04, 2021, from https://www.epa.gov/international-cooperation/international-efforts-wasted-food-recovery

[ii] "The Impact of Coronavirus on Food Insecurity." *Feeding America*, www.feedingamerica.org/research/coronavirus-hunger-research.

[iii] ReFED. (n.d.). A ROADMAP TO REDUCE U.S. FOOD WASTE BY 20 PERCENT. Retrieved from https://www.refed.com/downloads/Executive-Summary.pdf

[iv]ReFED. (n.d.). A ROADMAP TO REDUCE U.S. FOOD WASTE BY 20 PERCENT. Retrieved from https://www.refed.com/downloads/Executive-Summary.pdf

[V] Gomez, Miguel. "Functional or Fractured Supply Chains? Climate Change, COVID, and shared prosperity." Lecture. Cornell SC Johnson College of Business summer webinar series. Virtual. July 16, 2020. https://www.ecornell.com/keynotes/

[vi] Russell Redman 1 | Apr 01. (2020, April 01). Kroger sees March identical-store sales jump 30% due to coronavirus. Retrieved February 02, 2021, from https://www.supermarketnews.com/retail-financial/kroger-sees-march-identical-store-sales-jump-30-due coronavirus#:~:text=Kroger%20sees%20March%20identical%2Dstore%20sales%20jump%2030%25%20due%20to%20coronavirus,-'Hero%20bonus'%20instituted&text=With%20Americans%20stocking%20up%20to,identical%2Dstore%20sales%20for%20March.

[vii] Food Wastage Footprint & Climate Change. (n.d.). Retrieved February 2, 2021, from http://www.fao.org/3/a-bb144e.pdf

[viii] Rethink Food Waste. (n.d.). Retrieved February 02, 2021, from https://www.refed.com/

[ix] Burns, D., & Schneider, H. (2020, September 22). Fed, Treasury chiefs back more aid for small business but leave details fuzzy. Retrieved February 02, 2021, from https://www.reuters.com/article/us-health-coronavirus-usa-fed/fed-treasury-chiefs-back-more-aid-for-small-business-but-leave-details-fuzzy-idUSKCN26D0GD

[x] News Release: UNEMPLOYMENT INSURANCE WEEKLY CLAIMS. (n.d.). Retrieved February 02, 2021, from https://www.dol.gov/coronavirus

[xi] News Release: UNEMPLOYMENT INSURANCE WEEKLY CLAIMS. (n.d.). Retrieved February 02, 2021, from https://www.dol.gov/coronavirus

[xii] Bureau, U. (2020, January 02). Population Estimates Continue to Show the Nation's Growth Is Slowing. Retrieved February 02, 2021, from https://www.census.gov/newsroom/press-releases/2019/popest-nation.html

[xiii] Gunders, D., Dana Gunders - Alum JoAnne Berkenkamp - Alum Darby Hoover Andrea Spacht Collins, & JoAnne Berkenkamp - Alum. (2020, June 25). Wasted: How America Is Losing Up to 40 Percent of Its Food from Farm to Fork to Landfill. Retrieved February 02, 2021, from https://www.nrdc.org/resources/wasted-how-america-losing-40-percent-its-food-farm-fork-landfill"

[xiv]Bloom, J. (2011). *American wasteland: How America throws away nearly half of its food (and what we can do about it)*. Lifelong Books/Da Capo Press.

[xv] Food Wastage Footprint & Climate Change. (n.d.). Retrieved February 02, 2021, from http://www.fao.org/nr/sustainability/food-loss-and-waste/en/

[xvi] Frasz, D., Morris, H., Abbe, R., Mourad, M., & Rehberger, E. (n.d.). FOOD RESCUE SERVICES, BARRIERS, AND RECOMMENDATIONS IN ... Retrieved February 2, 2021, from http://www.ci.milpitas.ca.gov/wp-content/uploads/2017/01/SCC-Food-Rescue-Final-Report_FoodShift.pdf

[xvii] Brian E. Roe, Kathryn Bender, and Danyi Qi, "The Impact of COVID-19 on Consumer Food Waste," *Applied Economic Perspectives and Policy* n/a, no. n/a, accessed January 26, 2021, https://doi.org/10.1002/aepp.13079.

[xviii] ReFED. (n.d.). A ROADMAP TO REDUCE U.S. FOOD WASTE BY 20 PERCENT. Retrieved from https://www.refed.com/downloads/Executive-Summary.pdf

[xix] ReFED. Et al. A ROADMAP TO REDUCE U.S. FOOD WASTE BY 20 PERCENT. Retrieved from https://www.refed.com/downloads/Executive-Summary.pdf

[xx] Schatz, R. (2020, May 23). How 'Upcycled' Ingredients Can Help Reduce The $940 Billion Global Food Waste Problem. Retrieved February 02, 2021, from https://www.forbes.com/sites/robindschatz/2020/05/19/how-upcycled-ingredients-can-help-reduce-the-940-billion-global-food-waste-problem/?sh=23574efc3ac9

[xxi] Rethink Food Waste. (n.d.). Retrieved February 02, 2021, from https://www.refed.com/

[xxi] Rethink Food Waste. (n.d.). Retrieved February 02, 2021, from https://www.refed.com/

[xxii] Rethink Food Waste. (n.d.). Retrieved February 02, 2021, from https://www.refed.com/

[xxii] Rethink Food Waste. (n.d.). Retrieved February 02, 2021, from https://www.refed.com/

[xxiii] Hecht, A. A., & Neff, R. A. (2019). Food Rescue Intervention Evaluations: A Systematic Review. *Sustainability, 11*(23), 6718. doi:10.3390/su11236718
[xxiv] ECONOMIC ANALYSIS - Food Waste : ReFED. (n.d.). Retrieved February 2, 2021, from https://www.refed.com/downloads/Economic_Analysis.pdf
[xxv]Rethink Food Waste. (n.d.). Retrieved February 02, 2021, from https://www.refed.com/
[xxvi] Buzby, P. by J. (2021, March 9). *Good Samaritan Act Provides Liability Protection For Food Donations*. USDA. https://www.usda.gov/media/blog/2020/08/13/good-samaritan-act-provides-liability-protection-food-donations.
[xxvii] ReFED. (n.d.). A ROADMAP TO REDUCE U.S. FOOD WASTE BY 20 PERCENT. Retrieved from https://www.refed.com/downloads/Executive-Summary.pdf
[xxviii] Broad Leib, E., Ardura, A., & Fink, B. (n.d.). UNITED STATES LEGAL GUIDE FOOD DONATION LAW AND POLICY - Harvard Law School. Retrieved February 02, 2021, from https://hls.harvard.edu/dept/clinical/clinics/food-law-and-policy-clinic-of-the-center-for-health-law-and-policy-innovation/
[xxix] Rethink Food Waste. (n.d.). Retrieved February 02, 2021, from https://www.refed.com/
[xxx] Rethink Food Waste. (n.d.). Retrieved February 02, 2021, from https://www.refed.com/
[xxxi] Rethink Food Waste. (n.d.). Retrieved February 02, 2021, from https://www.refed.com/
[xxxii] Jones, H. "SB 1383: A revolution for organic waste." *Biocycle.net*. March 18, 2020. HYPERLINK "https://www.biocycle.net/sb-1383-revolution-organic-waste/"https://www.biocycle.net/sb-1383-revolution-organic-waste/
[xxxiii] Boswell, M. "An Overview of SB 1383's Organic Waste Management Requirements." *Presentation from CalRecycle*. October 2018. https://www.calhospital.org/post/overview-sb-1383-organic-waste-management-requirements
[xxxiv] "Local projects prevent 93 million pounds of food waste." *CalRecycle.* May 2, 2019. https://www.calrecycle.ca.gov/newsroom/2019/05may/12
[xxxv] Food Waste Reduction Alliance. (2020, May 21). FWRA's Work and Policy Guidelines. Retrieved February 02, 2021, from https://foodwastealliance.org/
[xxxvi] Hecht, A. A., & Neff, R. A. (2019). Food Rescue Intervention Evaluations: A Systematic Review. *Sustainability, 11*(23), 6718. doi:10.3390/su11236718
[xxxvii] Food Waste Reduction Alliance. (2020, May 21). FWRA's Work and Policy Guidelines. Retrieved February 02, 2021, from https://foodwastealliance.org/
[xxxviii] Meal Connect. *Meal Connect – Feeding America.* Accessed Jan 13, 2021. https://mealconnect.org/
[xxxix] MEANS Database. *MEANS Database.* Accessed January 13, 2021. http://www.meansdatabase.com/
[xl] Chow Bank. *Chow Bank.* Accessed January 13, 2021. Chowbank.io
[xli] ChowMatch. *ChowMatch.* Accessed January 13, 2021. https://www.chowmatch.com/features/
[xlii] Visram, Talib. "This DoorDash for surplus food aims to cut waste and help solve hunger. " *Fast Company.* April 28, 2020. https://www.fastcompany.com/90484157/this- doordash-for-surplus-food-aims-to-cut-waste-and-help-solve-hunger
[xliii] "Food Rescue Interventions Are Widespread, But Are They Effective?" *Johns Hopkins Center for a Livable Future.* December 19, 2019. https://clf.jhsph.edu/about-us/news/news-2019/food-rescue-interventions-are-widespread-are-they-effective
[xliv] Cohen, Darryl. " About 60.2M Live in Areas Most Vulnerable to Hurricanes." *Census.gov.* July 15, 2019. https://www.census.gov/library/stories/2019/07/millions-of-americans-live-coastline-regions.html
[xlv] What percentage of the American population lives near the coast?" *National Ocean Service - NOAA. 2014.* https://oceanservice.noaa.gov/facts/population.html
[xlvi] Phillips, C., Hoenigman, R., Higbee, B., and T. Reed. "Understanding the Sustainability of Retail Food Recovoery." *PLOS One*, 2013, vol 8 (10). 10.1371/journal.pone.0075530
[xlvii] "The 10 Largest States by Population." *Moving.Com. Accessed January 12, 2021.* https://www.moving.com/tips/the-10-largest-states-by-population/
[xlviii] "Food Waste FAQs." *USDA.gov.* Accessed January 31, 2021. https://www.usda.gov/foodwaste/faqs
[xlix] "Great Plates Delivered Santa Clara County Local Restaurant Activation and Emergency Feeding." *World Central Kitchen.* Accessed January 18, 2021. https://wck.org/greatplatesdelivered
[l] Nair, P. "FDA, EPA, and USDA Renew Inter-Agency Food Waste Reduction Initiative." *Ervin Cohen & Jessup LLP.* December 24, 2020. https://www.jdsupra.com/legalnews/fda-epa-and-usda-renew-inter-agency-55619/
[li] "United States Food Loss and Waste 2030 Champions." *EPA.gov.* Accessed January 31, 2020. https://www.epa.gov/sustainable-management-food/united-states-food-loss-and-waste-2030-champions
[lii] Lieb, E. B. Keeping Food Out of the Landfill: Policy Idea for States and Localities. *Harvard Law School Food Law and Policy.* October 2016. https://www.chlpi.org/wp-content/uploads/2013/12/Food-Waste-Toolkit_Oct-2016_smaller.pdf
[liii] "About the Initiative." *Wyoming Hunger Initiative.* Accessed July 12, 2020. https://www.nohungerwyo.org/about-the-initiative
[liv] Gousen, Emily. "New ingredients key to sustainable growth: Earned revenue and technology at food recovery nonprofits." *ReFED.* May 17, 2019. https://www.refed.com/content-hub/new-ingredients-key-to-sustainable-growth/