CASE STUDY

Reducing Plum Food Loss and Waste Across the Retail Supply Chain

A whole-chain approach in the Pacific Northwest

PACIFIC COAST Food Waste Commitment

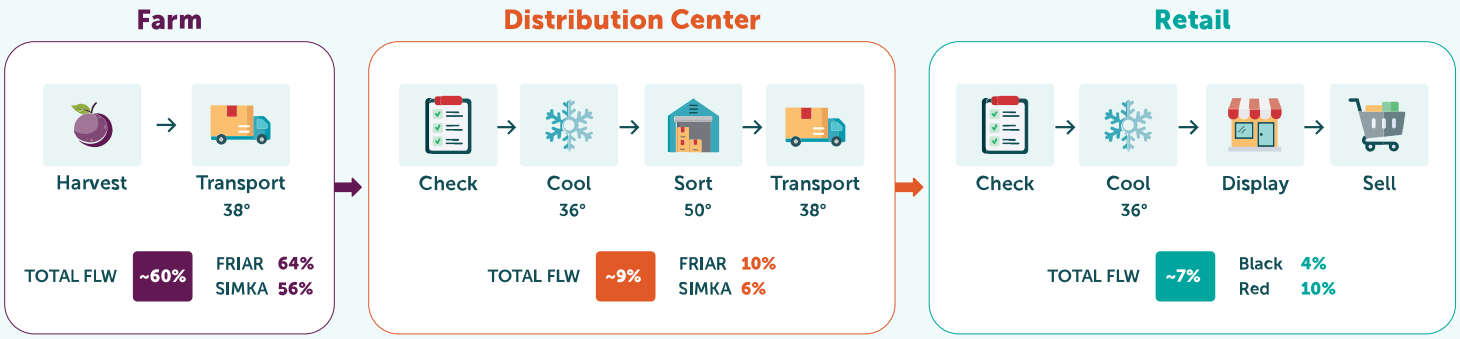
Spring 2025

Executive Summary

The Pacific Coast Food Waste Commitment (PCFWC) commissioned a study on food loss and waste (FLW) across the organic plum supply chain in Oregon and Washington. Two varieties of plums — Friars (black plums) and Simkas (red plums) — were measured at a small organic orchard, an organic distribution center, and a group of retail stores that specialize in local and organic foods. The aim was to understand the current state of food loss and waste, identify supply chain strengths and challenges, and recommend targeted interventions for FLW reduction. The study did not include the consumer (residential) stage of the supply chain.

While these numbers highlight opportunities to reduce FLW, it is important to note that stakeholders involved in this study are already implementing many FLW best practices. None of the discarded produce ended up in landfill, where it would emit greenhouse gases that contribute to climate change as it decomposes. However, there is still room to capture currently lost or unrealized value.

Plum Supply Chain with Food Loss and Waste Rates



% FLW is the average portion of the total received plums lost or wasted within each stage.

Identified Priority Solutions

Farm

- Implement onsite refrigeration
- Utilize new forecasting and communication tools between growers and their distributors and buyers
- Formalize partnerships with gleaners and more local secondary market buyers

Distribution Center

- Establish formal secondary markets
- Introduce value-added packaging options

Retailer

- Expand employee mentorship and training in food waste reduction
- Consumer education on food waste prevention coupled with recipe ideas
- Utilize AI order processing tools as a means to augment produce manager decisions

Across the Chain

- Enhance data-sharing and collaborative planning around weather events
- Explore joint market innovations and financing

Introduction

Reducing FLW — and especially preventing it — requires close coordination among stakeholders across the entire supply chain. A whole-chain FLW study provides comprehensive insight into the flow of products, waste hotspots at each node of the value chain, and priority opportunities for waste prevention or diversion at each node.

For this project, the PCFWC team gathered stakeholders across a local, organic plum supply chain to study FLW from harvest to retail within a 500-mile range. The Global Impact Collective, an impact-focused strategy firm with expertise in food systems, worked with JL Organic Orchards (the grower), Organically Grown Company (the distribution center), and New Seasons Market (the retailer) to study food loss and waste at each level with support from Cascade Agroecology at the farm level.

Over five months, the project team conducted site visits at the farm, distribution center, and several retail stores, collected data from enterprise software systems, and performed post-harvest measurements during the 2024 season across all supply chain nodes.

Scope of the Study

Data Sources and Timeframe
Farm, distribution center, and retail data from Pacific Northwest plum season (June-September).

Material and Lifecycle Stage
Whole Friar and Simka organic plums from harvest to retail.

Waste Destinations
Waste was left in fields or sent to animal feed or compost. Notably, no waste went to landfill.

Geography
Farms, distribution centers, and retailers in Oregon and Washington.

Why Study Plums in the Pacific Northwest?

Stone fruits, including plums, are labor-intensive to harvest because they require careful handling due to their delicate skins, and they are highly sensitive to weather and climate. The learnings from the pilot can be applied to similar fruits, such as peaches and nectarines, which also ripen rapidly (and often unexpectedly), requiring strong grower and buyer collaboration and responsive market strategies to mitigate food loss and waste. This study provides unique insights into the nuanced operational decisions of more locally driven supply chains versus national supply chains, which are studied more often.

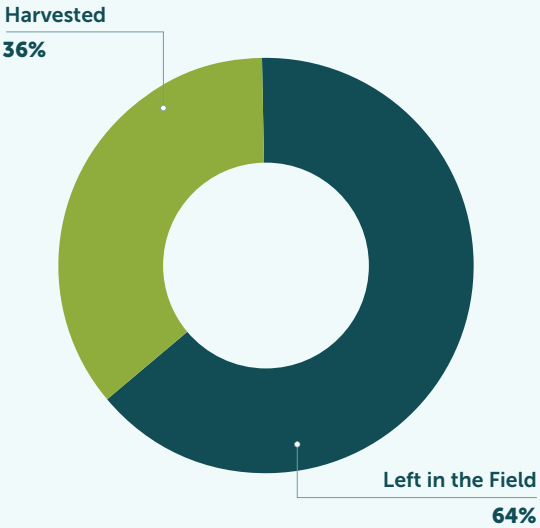
Food Loss and Waste at the Farm Level

JL's Organic Orchards grows two varieties of organic plums — Friars and Simkas — in the same plot. While most of the plums that go to market are the more typical Friar plums (on this farm, for every nine Friar trees, there is one Simka), the Simkas play an essential role in cross-pollination for both trees.

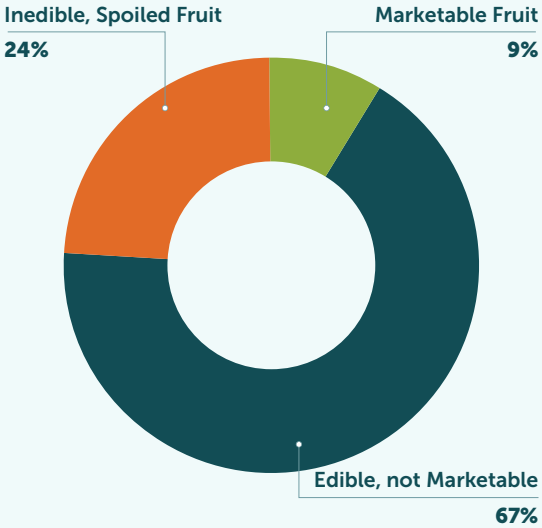
The farm harvests the plums each season by hand, typically starting in late July/early August and ending in early September. The farmer monitors the temperature in the field and relies on sensory indicators — sight, feel, and taste — to determine when the fruit is ready. Fruit is picked to maximize ready-to-eat, marketable fruit. The farmer communicates closely with the distributor to align harvest timing with pickup schedules.

Harvesting starts early in the morning to avoid the day's heat. Generally, pickers start at higher elevation gradients, as plums grown higher tend to ripen earlier. Harvesters collect the fruit in reusable plastic container (RPC) boxes, which are then stacked on pallets for pickup by temperature-controlled trucks from the distribution center. These trucks bring down the temperature of the fruit from the field, which slows ripening and extends shelf life.

Total Friar Plum Loss



Type of Friar Plum Loss



On average, 64% of mature Friar plums sampled were not harvested and therefore remained in the field or on the tree. Within this portion, 9% were marketable losses (fruit that could have been sold if harvested), 67% were edible, but unmarketable due to cosmetic defects from wind, frost, or size, and 24% were spoiled or too ripe by the time harvesters arrived.

Food loss was measured at the farm level using World Wildlife Fund's open-source Global Farm Loss Tool. The fruit remaining on a tree after harvest and in a 10x10 foot area underneath the canopy was collected, graded by quality and condition for retail sale, and weighed for a number of sample trees. It's important to note that the data was taken from an area of the field that ripened unusually quickly due to an unusual spike in temperatures and that loss throughout the orchard was likely lower on average.

Farm Best Practices for Reducing Loss

Close Communication with Distributor:

The farmer coordinates closely with the distributor to time harvests, minimizing delays that could cause overripening.

Trained and Reliable Workforce:

The harvesting laborers work on the farm across seasons and fruits, making them more practiced, reliable, and efficient.

Food Loss and Waste Drivers

Financial Pressures and Labor Costs:

Picking edible, non-marketable fruit adds labor costs without generating revenue, creating disincentives to pick non-marketable fruit.

Unpredictable Weather and Timing:

Unexpected warm spells force quicker harvest timelines, sometimes misaligning with scheduled truck pickups from the distribution center. Frost and wind also further damage the fruit.

Lack of Cold Storage:

Without onsite refrigeration, the farmer must align harvest precisely with pickup days or risk fruit over-ripening on the tree.

Solutions

Onsite Refrigeration:

Investing in small-scale cooling units allows farmers to pick earlier and hold fruit briefly, preserving quality and reducing marketable fruit losses. Cold storage can also open up opportunities to get edible, non-marketable plums to gleaners and processing partners.

Gleaner Partnerships:

Formalizing relationships with local or regional gleaning organizations like FarmLink or Harvest Against Hunger can help rescue edible, non-marketable fruit, diverting it to communities in need and capturing value for the grower through tax incentives or goodwill branding.

Preharvest Analysis:

This year's sudden changes in temperature — from frost to heat — are changing the way the farmer plans sections for harvest. Re-prioritizing sections that are now ripening quicker will reduce food loss and waste.

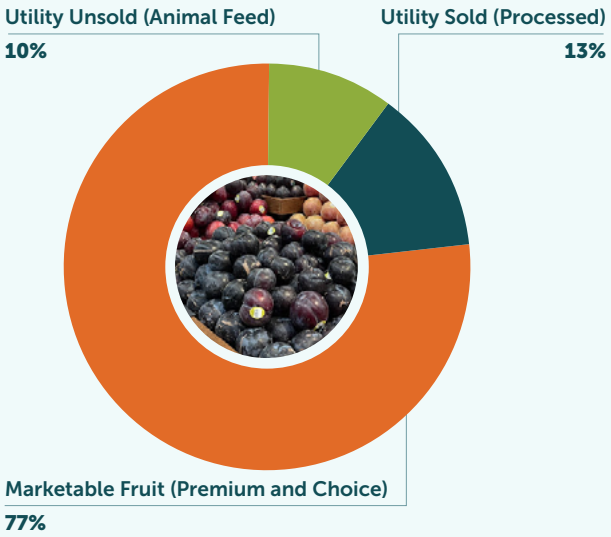
Food Loss and Waste at the Distribution Level

Organically Grown Company (OGC) is piloting a buying model in which it purchases the whole harvest from JL's Organic Orchards in an effort to support small-scale farms. When the refrigerated trucks arrive at the distribution center, the order is checked at the loading dock for accuracy and quickly assessed for general quality. It goes from the dock, directly into cold storage at 36°F.

From there, OGC transfers the fruit, by pallet, to the sorting area, where it is typically sorted into three price grades: Premium (large, generally over 1 7/8 inches in diameter, firm, and no scarring), Choice (smaller size, generally 1 5/8 inches and smaller, or some scarring), and Utility (soft, still edible, but not marketable on retail shelves). While employees are generally consistent in their grading, the benchmarks between each can change depending on the quality of the harvest. For instance, Premium and Choice categories can be combined if there is not enough Premium fruit during a particular harvest.

Sorters then transfer the marketable fruit to corrugated cardboard boxes for delivery to retail (the distributor and retailer prefer these boxes because they are breathable and easily stackable). OGC then attempts to sell all three grades of fruit. This model is unique because the distribution center is acting as both packer and distributor; distributors typically do not sort fruit, but by doing so here, the likelihood that the entire pallet might be rejected because of bad fruit decreases. By sorting and packing, OGC's goal is to retain and sell more marketable fruit than would typically be sold by a distributor.

Friar Plum Destinations



In this study, 77% of Friar plums were marketable (Premium or Choice), demonstrating the distribution center's ability to capture value across quality tiers. 13% was upcycled through sales to processors (in this case, a local brandy distillery) as Utility fruit, while 10% was channeled to animal feed. No fruit was donated for human consumption due to its highly perishable nature.

Distribution Center Best Practices for Reducing Loss

Whole-Harvest Purchasing Model:

By buying the entire harvest and sorting the fruit, the distribution center is experimenting with how this business model improves outcomes for the farmer and reduces food loss and waste.

Flexible Grading and Sorting:

Grading the fruit by price, while time consuming, creates an incentive structure for imperfect fruit, ensuring that as much harvested fruit goes to market as possible. It also protects against waste by separating overripe fruit from the rest of the lot.

Building Secondary Markets for Edible, Non-Marketable Fruit:

The distribution center develops relationships with processors, reducing the volume of fruit relegated to animal feed.

Food Loss and Waste Drivers

Unpredictable Timing and Inconsistent Volumes:

The small-scale nature of organic plums in the region, including inconsistent volumes and unpredictable timing, limits options for large-scale juicing. Scarring also creates issues for jams and other types of processing. While there are local buyers of Utility fruit, these relationships are informal and yield inconsistent demand and pricing.

Solutions

Formalized Secondary Market Channels:

Establishing a digital marketplace or additional cooperative agreements with regional processors (e.g., local cideries, distilleries, juice makers, or freeze-dry operations) could create more stable demand and better pricing for Utility fruit. Supply chain solution providers like Planet Harvest and Freshline work with distributors and may enable further market connections in the region. Regional trade associations such as Food Northwest work to advance the food processing industry in the Pacific Northwest and might offer additional market connections.

Enhanced Packaging Solutions:

Continued improvements in transport packaging, such as absorbent pads often used for berries, can absorb excess moisture, minimize bruising, and limit mechanical damage, improving shelf life and overall yield of saleable fruit.

Food Loss and Waste at the Retail Level

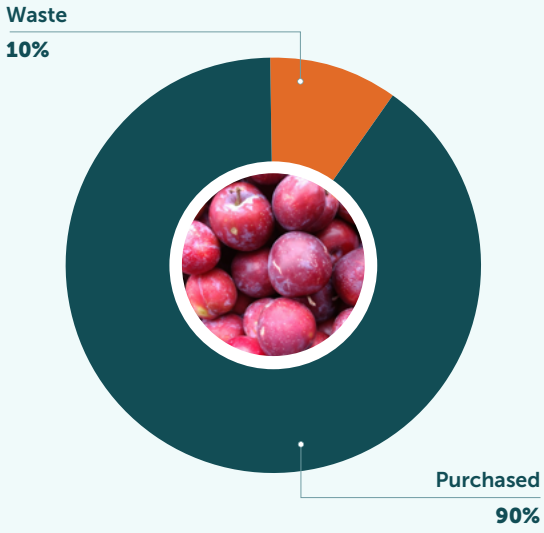
New Seasons Market (NSM) Produce Managers place their orders with the distributor daily. The plums arrive at the loading dock and go directly into the 36°F cold storage room. They are displayed on the retail floor using a first-in, first-out practice and are checked periodically throughout the day for freshness. They are never stacked too high, which could lead to bruising. If any individual fruit does not meet Produce Manager standards, a clerk will log out the edible, non-marketable fruit as "waste," and it will then be donated to gleaners or the company's "Blue Slip" program for staff.

Gleaners could be hunger relief organizations (food banks) or local farms that use the produce for animal feed. Once the plums are designated as waste, NSM does not track their destination.

At present, NSM rarely uses "manager's discounts" or dynamic pricing, a strategy in which retailers markdown surplus product that is close to expiration to drive sales and prevent food waste. This policy aligns with the retailer's high-quality brand positioning and promotes proactive and optimized ordering practices.

Black Plums

Red Plums



At NSM, the retailer does not track varieties of plums as a single category and instead includes Friar plums within a broader "black plum" category and Simkas within a broader "red plum" category. The study found that on average 4% of black plums were designated as waste across 21 stores, with individual store waste ranging from 1% to 16%, whereas 10% of red plums on average went to waste, with store waste ranging from 2% to 42%. In contrast with previous stages, in which Friar plum waste was higher than Simka waste, higher red plum waste at the retail level was likely due to increased market demand for black plums over red plums. The two varieties ripen at a similar rate after harvest.

The stores with higher purchased volumes tended to experience lower waste levels, likely due to higher traffic and more experienced Produce Managers. The store with 42% waste was a new store and therefore did not have historical data trends nor clear understanding of local demographic demands.

Retail Center Best Practices for Reducing Waste

Frequent Ordering and Rapid Turnover:

Daily assessing and ordering keep inventory fresh and reduce spoilage.

Data-Driven Culling Logs to Improve Ordering:

Some stores use detailed culling logs to improve ordering decisions and raise staff awareness around food waste prevention.

Managerial Expertise:

Experienced Produce Managers excel at forecasting sales, adjusting orders, and maintaining high-quality displays that attract attention and protect the fruit.

Food Loss and Waste Drivers

Variety Complexity:

There are over 2,000 varieties of plums. NSM found that scaling back to core varieties (6-7 from 10-12) helped match supply with demand while still offering a sufficient variety desired by their customers.

Dependency on Manager Experience:

Because every store has its own unique approach, new or inexperienced managers face a learning curve, potentially increasing waste until they gain sufficient expertise.

Solutions

Employee Mentorship and Training in Food Waste Reduction:

NSM maintains standard operating procedures for food loss and waste prevention. However, further developing training and mentorship programs around ordering can leverage the wealth of knowledge and expertise that experienced Produce Managers possess while instilling a sense of pride and healthy competition among stores. Expanding these programs would build on an already-strong ethos of sustainability.

Consumer Education:

While NSM has piloted price incentives for plums and noted that discounts did not significantly drive buying behavior, messaging about reducing food waste coupled with recipe ideas for plums could tap into environmentally conscious consumers who value resource stewardship. Additionally, sampling introduces new varieties, and rotating staff recommendation signage could enhance demand for less well-known plums.

AI Order Processing Tools:

NSM has only tried AI order processing tools outside of the produce department and did not feel the product met the company's needs, but these tools could be effective for produce when used in conjunction with strong institutional training and best practices, especially at new stores where historical buying data does not exist. If these products are not viable for small-scale grocers due to their unique needs, feedback to solution providers is essential to improve viability for others in this category.

Challenges Across the Supply Chain

While each stage of the plum supply chain — farm, distribution center, and retail — has implemented strategies to minimize food loss and waste, certain systemic hurdles persist. These challenges often cut across multiple value chain nodes, reflecting embedded complexities in agricultural production, market fluctuations, handling practices, and consumer preferences. Recognizing these interlinked difficulties is essential for designing coordinated, long-term solutions that strengthen the entire plum supply chain, from orchard to retail.

Best Practices for Reducing FLW

Close Distributor Communication:

The distributor works closely with the farm and retail to coordinate and ensure high quality produce.

Food Loss and Waste Drivers

Difficulty in Sustaining Improvements:

Initial food loss and waste reduction efforts may show quick gains, but maintaining them requires ongoing incentives, training, and market support.

Scaling Pilots Takes Time:

Testing new interventions (e.g., dynamic pricing or digital marketplaces for Utility fruit) is resource-intensive and may take multiple seasons to prove viability.

Maintaining Cold Chain Integrity:

Limited or no cold storage at the farm can lead to quality degradation, reducing plum shelf life and marketability.

Lack of Capital for Loss-Reducing Investments:

While the distribution center is taking extra steps to help market all the fruit it receives, farmers are only paid for sold fruit in full at the end of the season. While advances can be made, this can lead to potential cash flow problems for farmers and reduce their ability to make capital investments to improve the efficiency of their harvesting operations, such as onsite refrigeration or advanced forecasting tools.

Highly Perishable Food:

Local secondary markets are essential for selling highly perishable foods grown on a small scale because it is not economical or feasible to ship long distances in a short window of opportunity. Without these outlets, plums can't go to human consumption, which is the highest value use before animal feed, compost, and landfills.

Solutions

Supply Chain Data-Sharing:

Introducing improved data integration and communications — farm forecasting, distribution center grading outcomes, and retail sales data — can inform better decision-making at each stage. This is especially true for day-by-day logistics between the farm and the distribution center when produce is ready for harvest.

Collaborative Innovation:

Instituting joint planning sessions between farmers, distributors, and retailers to forecast demand, discuss packaging innovations, and explore value-added products could unearth various opportunities for improvement. One example could be creating value-added packaging (e.g., “snack-size plums”) to normalize smaller fruit sizes and develop a retail niche. This would require coordination across all supply chain players to ensure market demand and limit the risk of creating extra labor costs that would cut into grower returns without significant cost benefit.

Supply Chain Financing Models:

Developing tailored supply chain financing solutions in which growers receive early payment on their invoices from a third-party financial institution can help optimize farmers’ cash flow and working capital by enabling quicker payments.

Summary of Best Practices, Drivers, and Solutions Across the Supply Chain

	Current Best Practices	Drivers of FLW	Solutions
Farm	■ Close communication with distributor ■ Trained and reliable workforce	■ Financial pressures that disincentivize picking unmarketable plums ■ Unpredictable weather and timing ■ Lack of cold storage	■ Implement onsite refrigeration ■ Utilize new forecasting and communication tools between growers and their distributors and buyers ■ Formalize partnerships with gleaners and more local secondary market buyers
Distribution	■ Whole-harvest purchasing model ■ Flexible grading and sorting ■ Building secondary markets for edible, non-marketable fruit	■ Unpredictable timing and inconsistent volumes	■ Establish formal secondary markets ■ Introduce value-added packaging options
Retail	■ Frequent ordering and rapid product turnover ■ Data-driven culling logs to improve ordering ■ Staff experienced in produce ordering	■ Too many fruit varieties may be causing decision fatigue ■ Inexperienced store managers in new markets	■ Expand employee mentorship and training in food waste reduction ■ Consumer education on food waste prevention coupled with recipe ideas ■ Utilize AI order processing tools to enhance produce manager decisions
Across the Supply Chain	■ Close distributor communication with both farm and retail	■ Scaling pilots takes time ■ Lack of capital for loss-reducing investments	■ Enhance data-sharing and collaborative planning around weather events ■ Explore joint market innovations and financing

Glossary

Local: Within 500 miles.

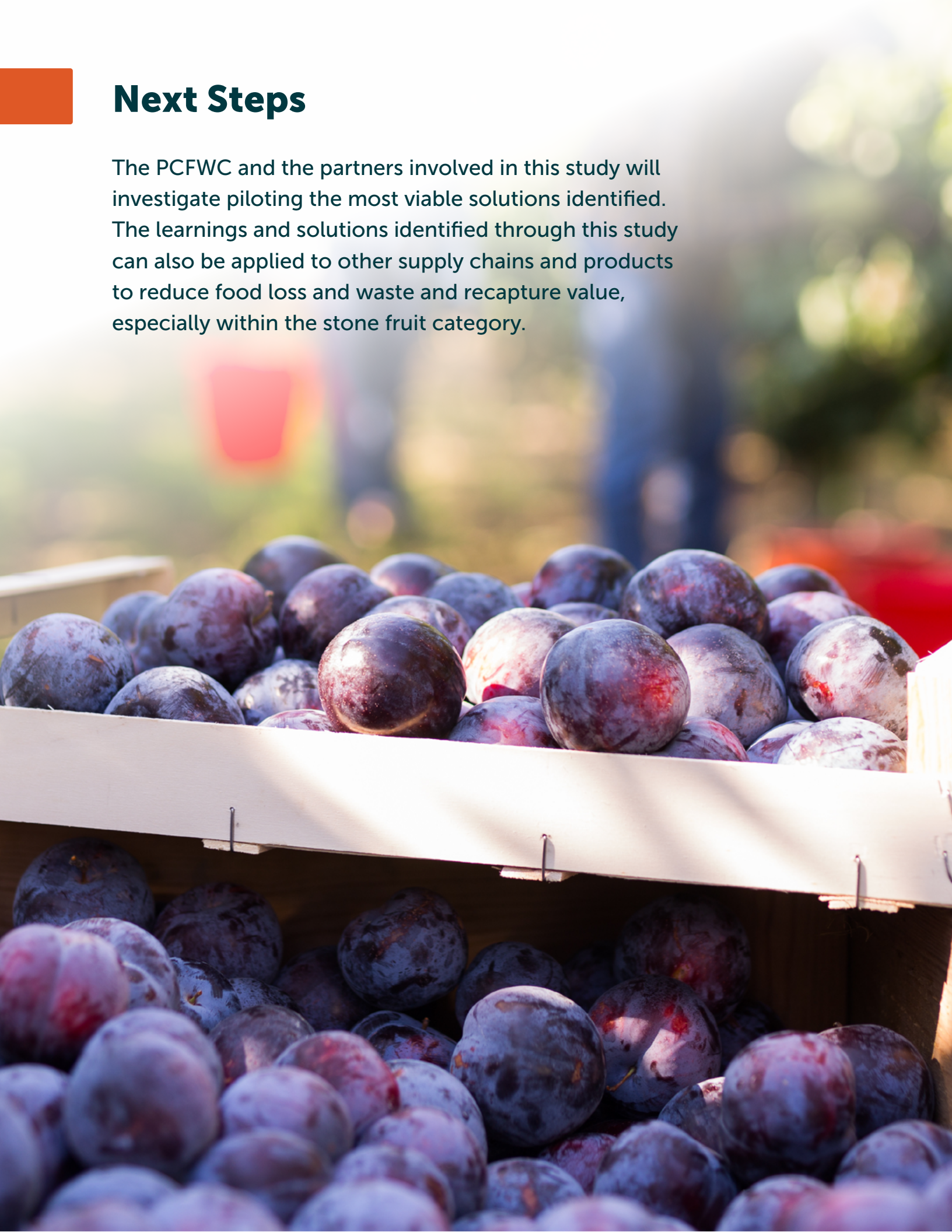
Small-Scale:

- Farm Level: Under $250,000 in annual gross cash income.
- Retail Level: Under 25 stores.

Gleaning: The act of collecting excess produce from farms, grocers, or any other food source in order to provide to those in need, often collected by volunteers.

Next Steps

The PCFWC and the partners involved in this study will investigate piloting the most viable solutions identified. The learnings and solutions identified through this study can also be applied to other supply chains and products to reduce food loss and waste and recapture value, especially within the stone fruit category.



Acknowledgments

The PCFWC would like to thank the collaborating partners for their participation in developing this case study: JL's Organic Orchards, Organically Grown Company, New Seasons Market, the Global Impact Collective, and Cascade Agroecology. This case study of plums serves as one example of the challenging but critical whole-chain collaboration required to develop best practices and accelerate progress on food waste prevention within the stone fruit industry and produce more largely.

About New Seasons Market (PCFWC Signatory)

New Seasons Market is a friendly neighborhood grocery store that believes great-tasting, local food has the power to build community and enhance lives. From taking care of its staff, partners, neighborhoods, and the environment to growing a sustainable business, it's doing what it loves with a commitment to cultivating a strong community centered around food. Founded in 2000 by three families and 50 friends in Portland, Ore., New Seasons Market is now a team of nearly 2,700 passionate staff across 21 stores in Oregon and Washington, serving a unique mix of locally sourced and organic items, classic grocery favorites, chef-made grab and go meal solutions. New Seasons Market is proud of its progressive values—from offering industry-leading compensation and benefits to committing 10% of its after tax profits to the communities it serves. For more information, visit www.newseasonsmarket.com.

About Organically Grown Company (PCFWC Signatory)

Founded by a group of small-scale farmers, activists and food lovers, OGC has been at the forefront of the organic movement since 1978. As the nation's only purpose-driven, trust-owned marketer of premium organic produce, OGC is dedicated to using business as a force for good. A partner with farms of all sizes, the company champions organic agriculture as the answer to healthy carbon-absorbing soil, a thriving planet and healthy people. OGC's impact extends beyond sourcing and distributing high-quality, certified organic produce. Through giving programs like the OGC Mission Fund, funded by 2.5% of net profits annually, they provide grants and in-kind donations to support organic farmers, nonprofits and community partners and fund initiatives that help growers adopt regenerative practices that improve soil health and biodiversity. For more information, visit www.organicgrown.com.

About JL's Organic Orchards

JL's Organic Orchards is a 4th generation, 100% organic tree fruit farm located in Zillah, WA. Formerly known as Leach Orchards owned and managed by Scott Leach, his son Jeff Leach took over the farm in 2022. Specializing mainly in pear varieties and expanding in plums and other soft fruits in recent years, JL's Organic Orchards takes pride in being a family-run small business with close relationships over the years to the local work force as well as marketing partners such as Organically Grown Company. The orchard takes a hands-on approach from the field to the customer, producing the best possible fruit.

About the Global Impact Collective

The Global Impact Collective is an impact-focused strategy firm with expertise in food systems that launched in 2023 with a singular purpose: To design a world that improves the lives and livelihoods of all. We believe that design thinking and human-centered design are effective and underutilized tools that can address sustainability and social impact challenges. The Global Impact Collective is led by globally recognized experts in design, technology, sustainability, and social impact. For more information, visit globalimpactcollective.net.

About Cascade Agroecology

Cascade Agroecology provides research to support farmers in their transition to biologically-based management practices and helps solve nuanced, context-specific problems with rigorous science. For more information, visit cascade.eco.

About the Pacific Coast Food Waste Commitment

The Pacific Coast Food Waste Commitment (PCFWC) arose out of the Pacific Coast Collaborative in 2016 and is an innovative public-private partnership made up of West Coast jurisdictions, U.S. food industry leaders, and nonprofit resource partners that together seek to eliminate food waste in the region by 50% by 2030. Learn more about the initiative and its members at pacificcoastcollaborative.org/food-waste.

Check out other PCFWC case studies in this series on the regional supply chains of strawberries and potatoes.

Photo Credits

Matt Jones, Cady Susswein, and Judith Hochhauser Schneider.

Pacific Coast Food Waste Commitment Business Signatories

(As of Winter 2024)

Retailers

Albertsons
ALDI
Kroger
NEW SEASONS MARKET
PCC COMMUNITY MARKETS
Raley's
SPROUTS FARMERS MARKET
Walmart

Hospitality and Foodservice

aramark
COMPASS GROUP
sodexo

Manufacturers

Bob's Red Mill
FOOD NORTHWEST We Feed You
LambWeston SEEING POSSIBILITIES IN POTATOES

Distributors

ORGANICALLY GROWN co

Growers

Del Monte Quality

Resource Partners

Cascadia Policy Solutions ENVIRONMENT | CLIMATE | ENERGY
ReFED
wrap
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