COMPOSTABLE CHICAGO

September 2022

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PRIMARY SPONSOR	EXECUTIVE SPONSORS	PROJECT TEAM
FPI FOODSERVICE PACKAGING INSTITUTE®	BPI	BRIGHT BEAT
	ECO PRODUCTS®	RRS recycle.com
	IFSC ILLINOIS FOOD SCRAP COALITION	
	PBPC Plant Based Products Council	
	SPC SUSTAINABLE PACKAGING COALITION®	

Project Thought Partners

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- **Ashley Elzinga**, Foodservice Packaging Institute
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- **Wilson Mora**, City of Chicago - Streets & Sanitation

Target Audience

- **COMPOSTERS** considering whether to accept FOH streams of organics with compostable packaging
- **OPERATORS** looking for best practices to improve diversion rates
- **REGIONAL STAKEHOLDERS** looking to evaluate the impact of compostable packaging on food scrap diversion

EXECUTIVE SUMMARY

01

Desired Project Outcomes

DEVELOP A METHODOLOGY for characterizing best practices related to the use of compostable foodservice items, characterizing organics streams, and making the correlation to both levels of contamination and food capture.

GAIN DIRECT INSIGHTS into how the use of compostable foodservice items, under best practices, can facilitate food scrap capture at venues, while controlling for levels of contamination.

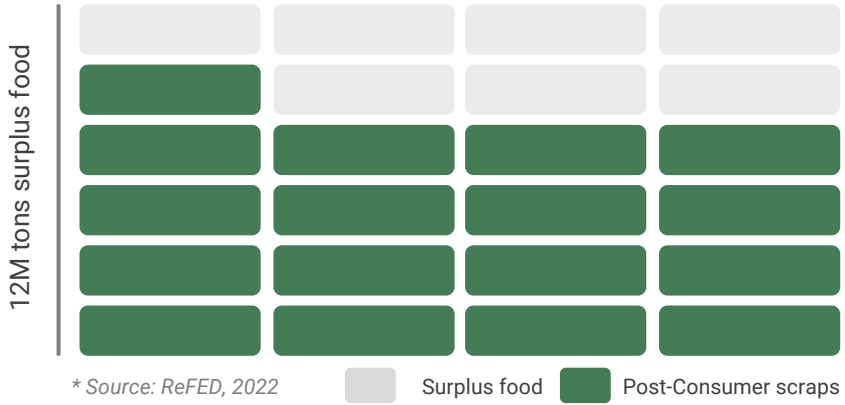
CREATE A GUIDE to serve as a consistent and repeatable approach so interested parties (venues, researchers, compost operators, etc.) can take steps to sample additional venues and gather information that will enhance the depth, diversity, and volume of data over time and strengthen the underlying correlations.

DRIVE DIALOGUE and greater understanding within the composting community around how compostable packaging can play a positive role in diverting high-quality FOH food scraps from foodservice environments

Current State & Opportunity

There is ample opportunity for food scraps from foodservice environments to be diverted from landfill to composting through FOH composting programs

- **12M tons surplus food** from U.S. foodservice industry
- **Post-consumer scraps** represent 70% of this surplus*



- Post-consumer FOH food scraps from foodservice represent an immense opportunity of organic material for composters
- Unpredictability related to impurities of FOH post-consumer supply challenges the reliability and economics of collecting from foodservice venues
- If stakeholders can address this issue and improve FOH food scrap delivery to compost bins while minimizing contamination, there is a potential to recover ~8M tons of organic waste a year

Project Rationale

				
Foodservice venues are seeking sustainable, circular approaches to diverting food scraps from the landfill	Compost manufacturers benefit from high-quality, nutrient-rich food scraps as a feedstock to the composting process	Certified compostable packaging simplifies messaging & streamlines processes which should boost participation and result in more food scraps captured for composting	Incoming feedstocks must be free of non-compostable contaminates to achieve compatibility with composting requirements for producing high-quality product	Understanding how use of compostable items, with best practices for implementation, can promote contaminant-free streams from FOH is a prerequisite for understanding how these products can help deliver more food scraps for composting

Motivating Question & Research Focus

Does the adoption of compostable foodservice packaging, implemented under the right operating conditions, correlate to increased capture of Front of House food scraps with minimized contamination?

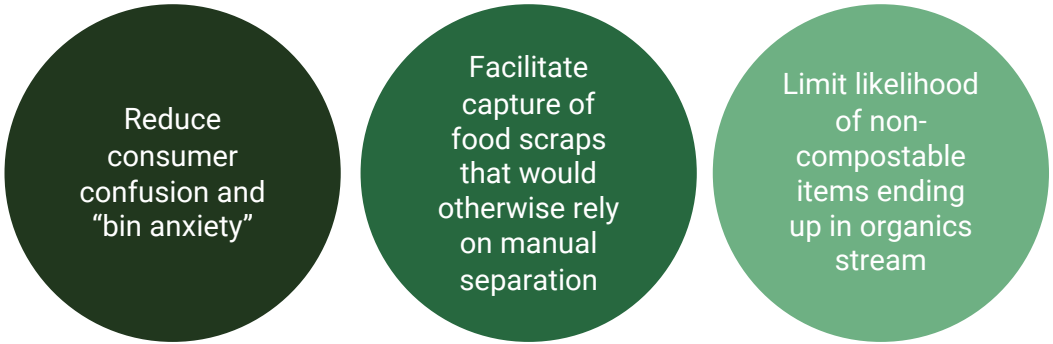
HYPOTHESIS 1	**COMPOSTABLES & FOOD CAPTURE** Venues that adopt compostable foodservice packaging under the right operating conditions should be expected to capture more food scraps in the Front of House compost stream.
HYPOTHESIS 2	**COMPOSTABLES & CONTAMINATION** Venues that adopt compostable foodservice packaging under the right operating conditions, should be expected to have less contamination in Front of House compost streams.

Underlying Benefits of Compostable Packaging

Compostable foodservice packaging is perceived to positively contribute to Front of House composting programs

- Compostable foodservice items simplify the sorting process for consumers at the point of disposal
- Simplifying or eliminating sorting requirements for the user makes it easier for food scraps to be placed in compost collection containers which should, in turn, result in more diverted food scraps
- Simplified collection reduces the presence of non-compostable items overall, and the likelihood of these items ending up in the organics collection bin as contaminants

Benefits of Compostables to the User



Supportive Operating Conditions Are Needed for Success in FOH Composting Programs

These four dimensions of operating conditions are expected to support FOH composting success, resulting in **increased organics diversion** from landfills and **reduced contamination** for the composter

- This framework provides a useful guide for planning well-designed FOH foodservice composting programs with the use of compostable foodservice items
- The project considered the presence of these conditions in four Chicago foodservice venues, then looked at how they correlate to increased food scrap capture and contamination levels in the composting stream
- Understanding the relative importance of individual explanatory attributes within each dimension should inform the basis of further research

PROCUREMENT

- Is the dining environment equipped with consistent, **certified compostable** packaging?
- Have **complicating factors** that increase the risk of contamination been **minimized**?

OPERATIONS

- Staff Training & Culture: Are staff **knowledgeable** about compostable items?
- Are staff **actively engaged** in the management of streams?

COMMUNICATION

- Do guests receive **clear instruction** in the dining environment regarding how to handle compostable and non-compostable foodservice items?
- Is messaging provided in the venue and through **labeling** on compostable items?

PEOPLE

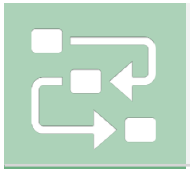
- Turnover: Do venue patrons have frequent exposure to **guidance and communications**?
- Do staff have extended experience / **familiarity with operational practices**, and are they using it to improve program performance?

The Project Approach

PLAN & DESIGN >	CASE STUDY: 4 CHICAGO VENUES >	GUIDE METHODOLOGY >	DELIVERABLES

▸ Define the central research questions
▸ Develop a framework to assess a venue's implementation of compostable foodservice items
▸ Develop methodology for characterizing foodservice venues waste streams
▸ Establish methodology to correlate compostables to:
  ▸ Capture of food scraps in compost stream
  ▸ Contamination in compost stream
	▸ Identify & pre-screen prospective venues with FOH composting
	▸ Assess venues via walkthrough
	▸ Evaluate venues' use of best practices for compost collection with compostables
	▸ Sample, sort, and characterize waste streams
	▸ Evaluate how compostables correlate to capture of food scraps and mitigation of contamination
		▸ Articulate pathway to collect sufficient data over time to develop statistically robust correlation analysis
		▸ Vision for correlation
		▸ Prepare a step-by-step guide for project teams seeking to emulate study approach
			▸ Report detailing approach, methods, and case study results
			▸ Standalone Guide to developing a statistical correlation through repeat sampling
			▸ Guide Methodology for case study replicability
			▸ Data collection tools

Key Takeaways



A repeatable approach was developed to study how foodservice operating conditions impact food scrap capture and contamination. The approach was then implemented in four Chicago venues.

Operating conditions related to use of **compostable foodservice items,** and likely associated with **food capture** and **contamination,** were gauged via a **4-Dimensional Framework.**

Accompanying **Guide** details steps for **repeatable approach to continued exploration** of researched correlation between use of compostable foodservice items and food capture.

Further sampling will enhance **statistical evaluation** of correlations and detailed **driver analysis.**

Increased food capture was observed to **trend higher** in venues that have higher implementation of **compostable foodservice packaging.**

Generally, **contamination levels** was observed to **trend lower** with **higher adoption of compostables.**

Project findings support the hypothesis that high percentages of food scraps can be captured in Front of House compost streams relative to packaging, and with low levels of contamination, as long as certain operating conditions are met.

02

CASE STUDY

EVALUATING COMPOSTING STREAMS IN FOUR CHICAGO FOODSERVICE VENUES

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Case Study - Chicago

- The CompostAble Chicago Project Team identified four foodservice venues of different types to serve as a real-world data collection
- The case study provided a means of collecting data from actual foodservice operations that can associate operating conditions to the contents of the venues' various waste streams
- The study demonstrates the type of data that can be obtained through a well-designed research effort and serve as a preliminary dataset to illustrate the linkage between best practices for compostable foodservice items and successful collection of food scraps in the Front of House

Chicago Sort Study: Methodology

Venue Identification, Characterization, and Waste Sort Comparison

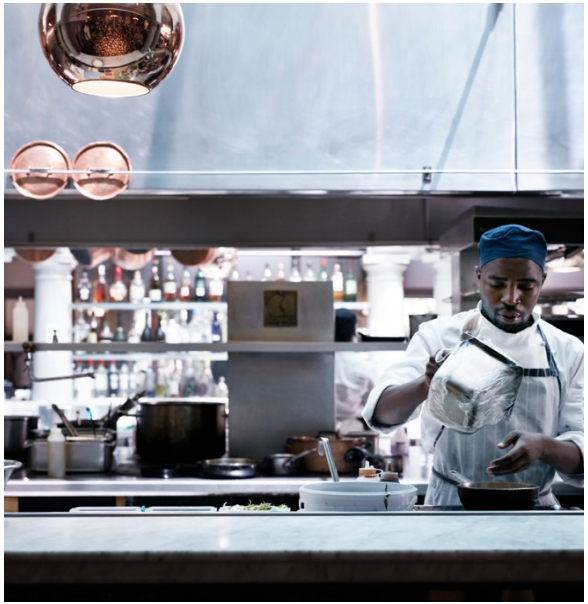
Venues are selected according to a minimum criteria around geography, material streams, program maturity, commitment, and minimum generation rate. Selected venues are diversified across food services.

Ideal Material Streams	Minimum Material Streams	Measures
Front of House Compost	Compost (FOH)	Weight & Volume
Back of House Compost		
Front of House Trash	Trash (FOH or BOH)	Weight & Volume
Back of House Trash		
Recycling	Recycling (if provided at the venue)	Weight & Volume

1	2	3	4	5	6	7
IDENTIFY VENUES TO PARTICIPATE IN STUDY	PRE-SCREEN VENUES FOR COMPATIBILITY Assess venue candidacy	ON-SITE VENUE WALKTHROUGHS & QUESTIONNAIRE Perceive site practices, flow of materials, collection bin set-up, meals served	CHARACTERIZE VENUE ATTRIBUTES & BEST PRACTICES	COLLECT WASTE STREAM SAMPLES Provide staff container signage & bags to move material to correct container	SORT & CHARACTERIZE WASTE STREAMS Sort according to category; weigh material, % full measure for volume	ANALYZE DATA & EVALUATE CORRELATION Combine data; dependent variables: captured quantities of food scraps/ compostable materials in organics stream and contamination rates

1. Venue Recruitment

The Project Team selected, engaged, and evaluated venues for participation through a deliberate process, collecting critical information related to their composting program



- In the CompostAble Chicago case study, prior to selection for study, venues were assessed for:
  - Number of distinct compostable items
  - Whether they had a FOH organics collection for composting
  - Estimated amount of material generated in a week
  - Does waste stay on site (i.e., dine-in)
  - Initial review of operating conditions for use of compostable items
- From this pre-screening, venues were engaged on willingness to participate and sort logistics
- Venues responded via a questionnaire and in-person interview to share venue characteristics and waste management practices

2. Participating Venues

VENUE 1

Full-Service Restaurant
Full Service (includes casual and fine dining)

VENUE 2

Public Attraction (Museum)
Quick Serve (includes fast food and fast casual/cafe)

VENUE 3

School Cafeteria
Self-Serve Cafeteria Style (includes catered events)

VENUE 4

University Café
Quick Serve (includes fast food and fast casual/cafe)

2-3. Pre-Screen Venues & Conduct Walkthroughs

- The Project Team collected preliminary information from prospective venues to confirm an active Front of House composting program & use of compostables
- Collected relevant venue information through visual inspection and questionnaire

	VENUE 1 Full-Service Restaurant	VENUE 2 Museum	VENUE 3 School Cafeteria	VENUE 4 University Café
Foodservice Type	Full Service	Quick Serve (fast food and fast casual)	Self-Serve Cafeteria	Quick Serve (fast food and fast casual)
Staffing	40 staff	35-40 at the facility 15-20 in the kitchen	Waste/maintenance, Kitchen: 3 Cafeteria: 2	6 staff
Meals/Day	200-300 meals	600 meals	925 meals	280 transactions, includes coffee
% Meals **Consumed Onsite**	75-100% onsite	75-100% onsite	75-100% onsite	75-100% onsite

03

APPLYING THE FRAMEWORK:

HOW CASE STUDY VENUES FARE IN THE ADOPTION OF COMPOSTABLES

Evaluating Relevant Operating Conditions of Venues

- The Project Team gathered and organized information related to the operating conditions of venues that was collected through the pre-screening process, including questionnaires and on-site walk-throughs
- Venues were assigned scores from 1-5 based on a series of specific attributes that underly the four framework dimensions: Procurement, Operations, Communications, and People
- Scores were assigned based on information collected during the onsite walk-throughs in accordance with the included scoring rubric*

** Complete scoring rubric can be found in Appendix B*

CHARACTERIZE VENUE PRACTICES

Dimension 1 – Procurement

Is the dining environment equipped with consistent, certified compostable packaging and minimal complicating factors that might increase the risk of contamination?

Primary Indicators (Independent Variables)	VENUE 1 Full-Service Restaurant	VENUE 2 Museum	VENUE 3 School Cafeteria	VENUE 4 University Café
Number of distinct single-use foodservice items (Note: green items are compostable)	**3** 12-16 items 12 Items: **cutlery, container, clamshell, portion cup, beverage cup, cup lids, cup sleeve, plate, straws, lid, bags, napkins**	**1** 22+ items 33 Items	**4** 7-11 items 11 Items: cutlery, **napkins**, wrappers, portion cup, cup lid, **tray/plates**, cartons, packets, plastic bags, plastic cup, fry boats	**3** 12-16 items 15 Items: **cutlery, cup lids, hot cups, domed hot lid, soup cups, cup sleeve, clamshell, container, wrapper, napkins**, non-compostable wrapper, container, plastic cutlery, plastic cups, honey packets
Proportion of single-use foodservice packaging that is compostable	**5** 12 compostable out of 12	**4** 28 compostable of 33 total	**1** 2 compostable out of 11	**3** 10 compostable out of 15
Proper pairing of bundled items (cup & lid, etc.)	**5** All items bundled properly	**4** Compostable cup + PET lid	**4** Napkin in with cutlery packet	**4** Wrappers in containers
Limited prevalence of non-compostable single-use items (condiments, stirrers, wrappers, etc.)	**5** All small items compostable	**4** Plastic cutlery in with compostable cutlery	**1** All small items – cutlery, packets, wrappers intended for trash	**4** Plastic cutlery in with compostable cutlery
DIMENSION SCORE: PROCUREMENT	**18/20**	**13/20**	**10/20**	**14/20**

Low ← → High

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Note: Complete scoring rubric can be found in Appendix B. Scores based on 1-5 scale; lowest possible dimension score is 4/20

CHARACTERIZE VENUE PRACTICES

Dimension 2 – Operations

Is the dining environment equipped with consistent, certified compostable packaging and minimal complicating factors that might increase the risk of contamination?

Primary Indicators (Independent Variables)	VENUE 1 Full-Service Restaurant	VENUE 2 Museum	VENUE 3 School Cafeteria	VENUE 4 University Café
FOH STREAM MANAGEMENT Does the facility actively sort or review FOH streams for contamination?	5 Staff handle disposal	3 Staff handle disposal when their capacity allows	5 Green Team guide disposal	1 Patrons handle disposal
MINIMIZATION OF OUTSIDE MATERIALS Is there low likelihood of outside materials contaminating the stream?	5 Outside food / beverage unlikely	5 Outside food / beverage not allowed in	3 Limited or occasional outside food / beverage	3 Limited or occasional outside food / beverage
TARGETED PROGRAMS OR PROTOCOLS Does the venue implement dedicated measures to improve food capture and implementation of compostable items?	5 Staff manages bins	5 Facility messaging clearly indicates measures	5 Student Green Team collects & discards scraps	1 Space and activities are not-monitored
STAFF TRAINING Are staff equipped to recognize and differentiate compostable vs. non-compostable items?	5 Staff training is constant	5 Trained upon hiring, before busy season, pre-shift pop quiz	3 Staff training provided	5 Staff training provided
DIMENSION SCORE: OPERATIONS	**20/20**	**18/20**	**16/20**	**10/20**

Low — High

Note: Complete scoring rubric can be found in Appendix B. Scores based on 1-5 scale; lowest possible dimension score is 4/20

CHARACTERIZE VENUE PRACTICES

Dimension 3 – Communications

Do guests receive clear instruction in the dining environment regarding how to handle compostable and non-compostable items after use through messaging in the venue and on compostable items?

Primary Indicators (Independent Variables)	VENUE 1 Full-Service Restaurant	VENUE 2 Museum	VENUE 3 School Cafeteria	VENUE 4 University Café
LABELING Is compostable serviceware readily identifiable as such?	4 Most are labeled	3 Many are labeled	1 Labeling not clearly identifiable	3 Many are labeled
PATRON MESSAGING Do patrons have clear sorting guidance?	1 No signage	4 Clear FOH signage / bin labels	5 Clear signage, pictures / icons of acceptable materials & contaminants	4 Signage mostly clear, one compost bin mis-labeled
CULTURE & COMMITMENT Does the venue embrace a commitment to principles of sustainability	5 'We Compost' decal on the window	5 Awards won and on display; staff are given reusables	5 High-visibility environmental messaging highlights WHY	5 Institutional commitments; location in Environmental Science building
DIMENSION SCORE: COMMUNICATIONS	**10/15**	**12/15**	**11/15**	**12/15**

Low ← → High

Note: Complete scoring rubric can be found in Appendix B. Scores based on 1-5 scale; lowest possible dimension score is 3/15

CHARACTERIZE VENUE PRACTICES

Dimension 4 – People

Do venue patrons have frequent exposure to the venue's guidance and communications? Do staff have extended experience and familiarity with operational practices, and are they used in targeted ways to improve program performance?

Primary Indicators	VENUE 1 Full-Service Restaurant	VENUE 2 Museum	VENUE 3 School Cafeteria	VENUE 4 University Café
MINIMAL PATRON TURNOVER Are patrons consistently and repeatedly exposed to the venue's guidance, protocols, & messaging?	1 High Turnover	1 High Turnover	5 Minimal Turnover	4 Low Turnover
MINIMAL STAFF TURNOVER Does the venue benefit from knowledgeable and experienced staff?	5 Most staff present >1 yr	5 Most staff present >1 yr	5 Most staff present >1 yr	5 Most staff present >1 yr
DIMENSION SCORE: PEOPLE	**6/10**	**6/10**	**10/10**	**9/10**

Note: Complete scoring rubric can be found in Appendix B. Scores based on 1-5 scale; lowest possible dimension score is 2/10

CHARACTERIZE VENUE PRACTICES

Combined Results – 4 Dimensions

Quantifying the degree of implementation of compostable foodservice items with an overall score.

DIMENSION SCORES	VENUE 1 Full-Service Restaurant	VENUE 2 Museum	VENUE 3 School Cafeteria	VENUE 4 University Café
1 PROCUREMENT	18/20	13/20	10/20	14/20
2 OPERATIONS	20/20	18/20	16/20	10/20
3 COMMUNICATIONS	10/15	12/15	11/15	12/15
4 PEOPLE	6/10	6/10	10/10	9/10
COMBINED SCORE	**54/65**	**49/65**	**47/65**	**45/65**

NOTES:

- *Comprehensive scores reflect total of scores of all underlying attributes within each category. Scores based on 1-5 scale; lowest possible combined score is 13/65*
- *It is to be expected that a sole attribute might have outsized influence on outcomes relative to that of other attributes*
- *Continued sampling over time may reveal further insights into useful weighting*

CHICAGO VENUE WASTE SORTS

Characterization of the Venues' Waste Streams

The Project Team collected and sorted sample waste from each venue to quantify the amount of foodservice packaging and food scraps in each stream. Sampling, sorting, weighing, and otherwise measuring the materials in each stream (e.g., FOH & BOH compost, trash, and recycling) allows Project Team to:

Measure quantities of items relative to each other	Provide food scraps capture and contamination data	Compare quantities and capture rates across venues
Both weight and volume measurements were used to provide multiple perspectives and metrics for evaluating materials found in the streams	Once streams are sorted and weighed, the amount of materials correctly disposed of in the stream over the total amount in that stream provides capture and contamination rates	Capture and contamination rates were compared across all four venues. Over time, as more data is collected in a similar manner, comparisons will become more robust and informative

Materials Collection

The Project Team met with venue staff to detail how materials would be separated and samples would be collected from each stream

- Using material density factors, the Project Team estimated the number of containers needed for each material stream. Total of 20-24 containers were placed at each venue
- Based on the venue-reported generation, haulers placed containers up to a week prior to the sort, as required
- Containers were labeled according to material streams. Venue staff were instructed to label bags of materials for the stream with stickers or tape before depositing bags in the matching container

Materials Sort

Each sample was sorted by hand into consistent categories

- Each sample was sorted individually, with material hand sorted into 37 categories
- After all material was sorted, containers were weighed and separately by “percentage full” to generate a volume measurement
- The number of compostable straws, compostable utensils, and plastic straws / utensils were counted for each stream
- Post-sort separated recyclables were collected and recycled by Lakeshore Recycling Systems
- Post-sort organics were collected and recycled by Collective Resource Compost

7. Waste Streams Sorted

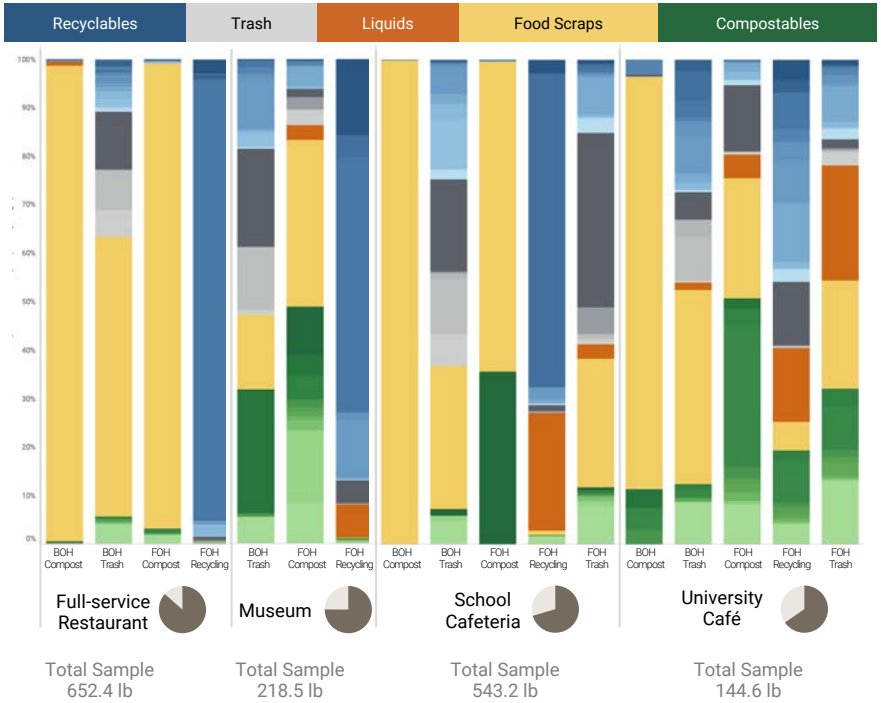
	VENUE 1 Full-Service Restaurant	VENUE 2 Museum	VENUE 3 School Cafeteria	VENUE 4 University Café
Streams Provided	Front of House: • Compost Back of House: • Compost • Trash • Recycling	Front of House: • Compost • Recycling Back of House: • Trash	Front of House: • Compost • Trash • Recycling Back of House: • Compost • Trash	Front of House: • Compost • Trash • Recycling Back of House: • Compost • Trash
Certified Compostable Product Types / Categories	• Bag / film / pouches • Beverage cup • Clamshell • Container • Cup lids • Cup sleeve • Cutlery • Napkins • Plate / bowl • Portion cup • Straws	• Bag / film / pouches • Beverage cup • Clamshell • Container • Cup lids • Cup sleeve • Cutlery • Napkins • Plate / bowl • Portion cup • Straws	• Napkins • Plate / bowl (trays)	• Bag / film / pouches • Beverage cup • Clamshell • Container • Cup lids • Cup sleeve • Cutlery • Portion cup • Straws • Wrappers
Total Weight Sorted	652.4 lb	218.5 lb	543.2 lb	144.6 lb
Important Study Stream Notes	FOH streams are managed by venue staff. For the study, they provided FOH & BOH compost separately but combined the FOH and BOH streams for trash and recycling. Inhibits assessment of food capture & contamination in FOH.	No BOH compost received - labeled FOH compost bags placed in BOH compost containers. No FOH trash received – Containers labeled FOH trash belonged to another venue. Inhibits assessment of food capture & contamination in FOH.	Cafeteria serves food on compostable trays. Collected all requested streams.	Venue staff stated they generate low volumes of material. Containers placed a week prior to sort. However, venue did not generate full samples. Collected all requested streams.

7. Venue Insights from Waste Characterizations

	VENUE 1 Full-Service Restaurant	VENUE 2 Museum	VENUE 3 School Cafeteria	VENUE 4 University Café
Influential Venue Characteristics	• Compostable foodservice packaging used for to-go meals • Majority of meals eaten on site (75%-100%) • Staff manages FOH streams	• Open to the general public • Large venue, serving hundreds of meals/day, with 30+ single use products • Recycled content cups substituted for unavailable compostable product by distributor	• Virtually 100% repeat customers • Sorting station – students dump liquids, sort materials, etc. • Strong signage • Low percentage of outside materials • Dedicated student "Green Team" supports program / sorting	• Mostly repeat customers • Use both compostable and non-compostable foodservice packaging products • PLA cutlery in use but guidance to landfill • One FOH compost bin had correct signage but incorrect 'Waste' bin label
Contamination Insights (% by weight)	• FOH Compost Contamination: <1% • BOH Compost Contamination: <1% • 95%+ of compost streams made up of food scraps	• FOH Compost Contamination: 13% • Main contaminants: plastic cups (4%), non-compostable wrappers (3%), & residue (2%) • Distributor provided PET lid with large compostable cup	• FOH Compost Contamination: 0% • BOH Compost Contamination: 0% • Compostable trays stacked and separated after food scraped	• FOH Compost Contamination: 18% • BOH Compost Contamination: 3% • Main contaminants: plastic bags / film (12%)
Food Capture Insights	• **79% food in compost bins,** by weight • BOH trash high in food waste & compostable serviceware (46%)	• **93% food in compost bins**, by weight • FOH Trash and BOH Compost missing	• **87% food in compost bins,** FOH and BOH by weight	• **61% food in compost bins,** FOH and BOH by weight
Top Compostable Materials Found in FOH Compost (% Total Stream by weight & vol)	**Compostable Clamshells** Vol: 16.2% / Wt: 0.9% **Napkins/Paper Towels** Vol: 4.3% / Wt: 1.6% **Compostable Straws** Vol: 3.2% / Wt: 0.3% **Other Compostables** Vol: 1.1% / Wt: 0.2%	**Fry Boats:** Vol: 11.5%/Wt: 14.8% **Plates/Bowls:** Vol: 10.7%/Wt: 9.9% **Bev Cups:** Vol: 9.5% / Wt: 4.9% **Napkins/Towels:** Vol: 7.3%/Wt: 0.2% **Bags/Films:** Vol: 5.5%/Wt: 4.3%	**Plates Bowls:** Vol: 85.1%/Wt: 35.3% **Bags/Films:** Vol: 1.7%/Wt: 0.2% **Napkins/Towels:** Vol: 0.4%/Wt: 0.2%	**Clamshells:** Vol: 39.8%/Wt: 29.4% **Napkins/Towels:** Vol: 10.2%/Wt: 7.9% **Bags/Films:** Vol: 5.1%/Wt: 2.2% **Bev Cups:** Vol: 3.4%/Wt: 3.1% **Bags/Films:** Vol: 5.1%/Wt: 2.2% **Containers:** Vol: 2.5%/Wt: 2.3% **Wrappers**: Vol:6.8/Wt: 0.5%

Food scraps and compostable items, by **weight**, are the largest component of restaurant FOH compost streams

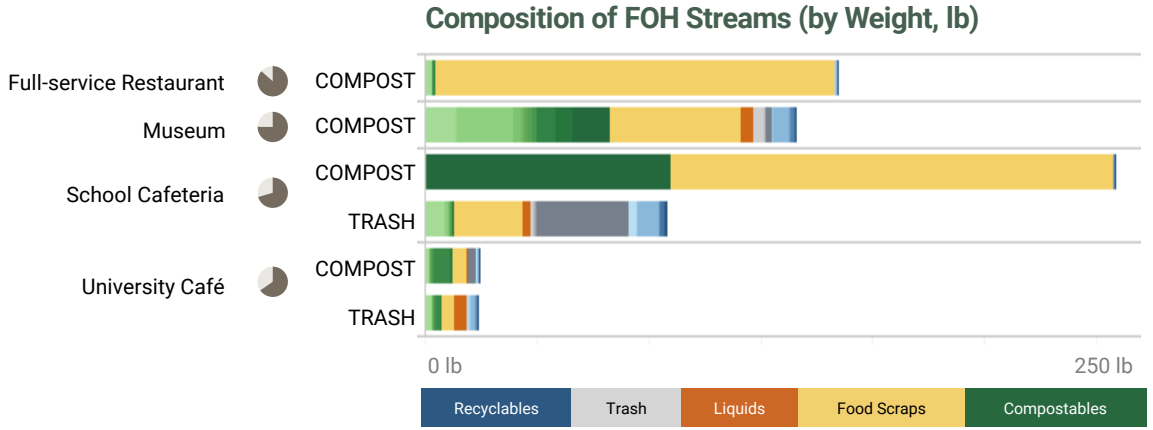
- For the highest scoring venue, food scraps were found to be, by a wide margin, the largest component of compost streams
- Food scraps were generally found in FOH compost streams to be more predominant than compostable packaging materials
- Significant food scraps and compostable packaging was identified in all trash streams, however FOH trash streams were not able to be sampled from the restaurant and the museum

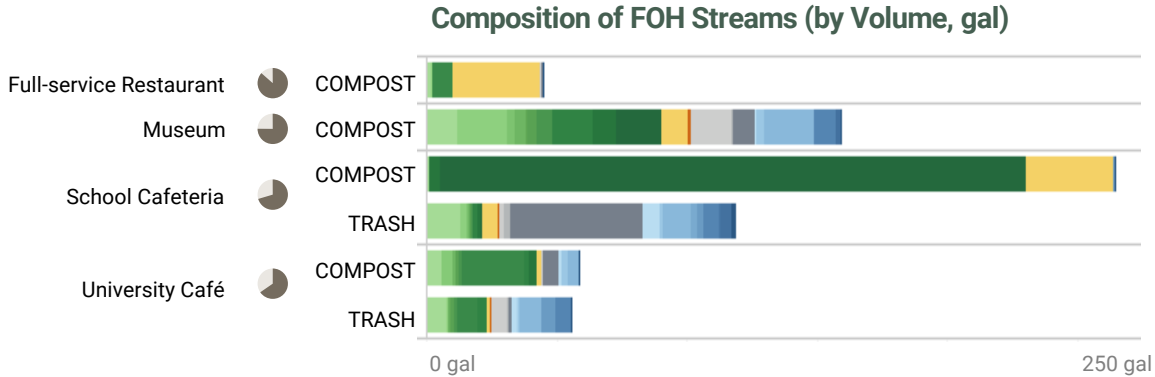


Contamination levels in the FOH compost streams varied significantly from exceptionally low levels to moderate levels

- Museum & university café FOH compost had more contaminants by weight & volume
- Food scraps (including liquids) and compostable items made up about half of FOH trash at school cafeteria and university café
- Discovery of comingled material in the compost streams suggests venue staff sorting inaccuracies and opportunity for operational improvements*

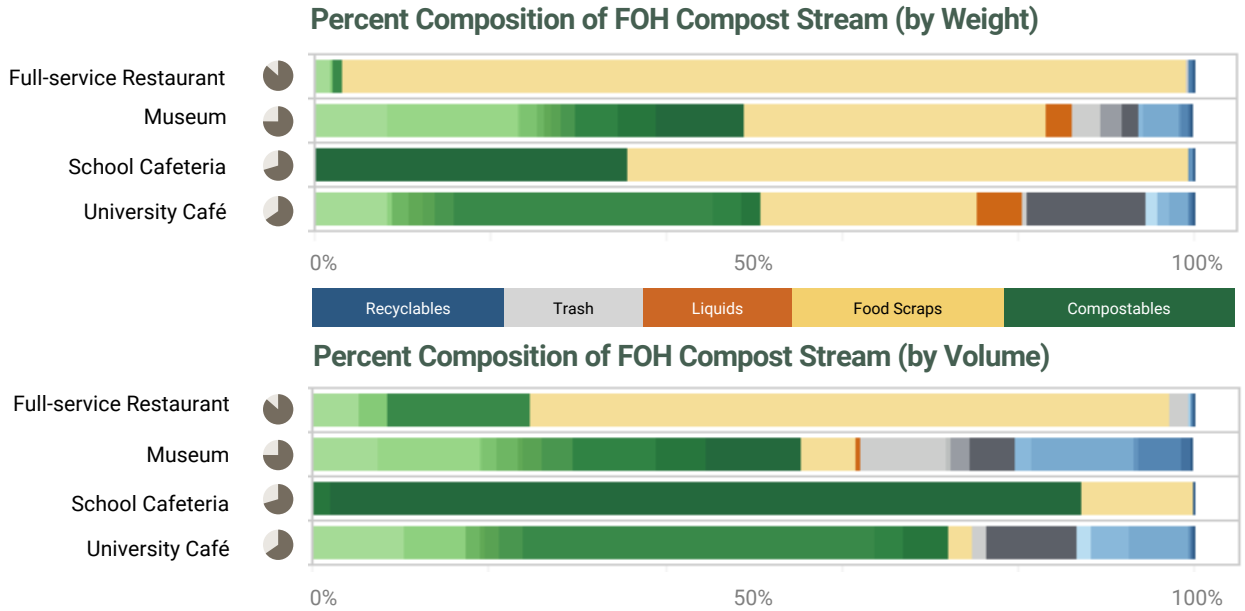
** Large amounts of trash and recyclables in compost stream and organics in trash stream*





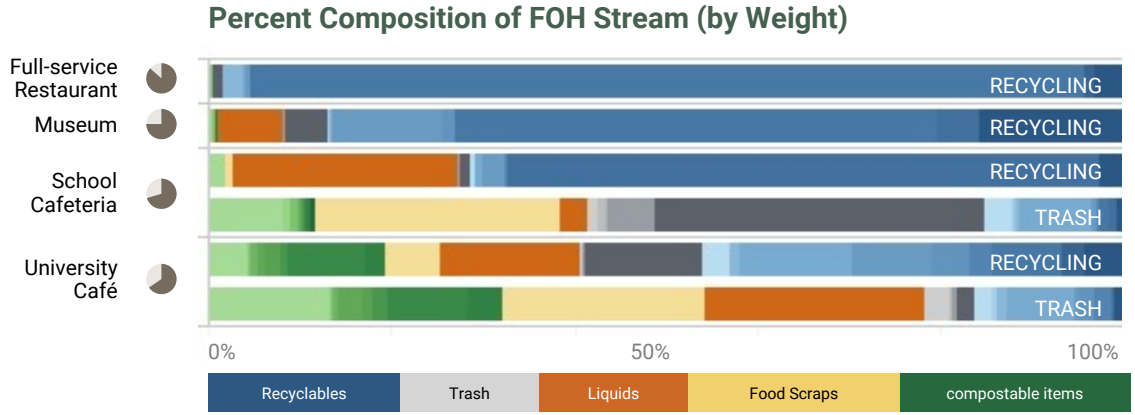
Venues with a combined score of 26+ on Operations and People framework dimensions (restaurant & cafeteria) showed lower rates of contamination in compost streams

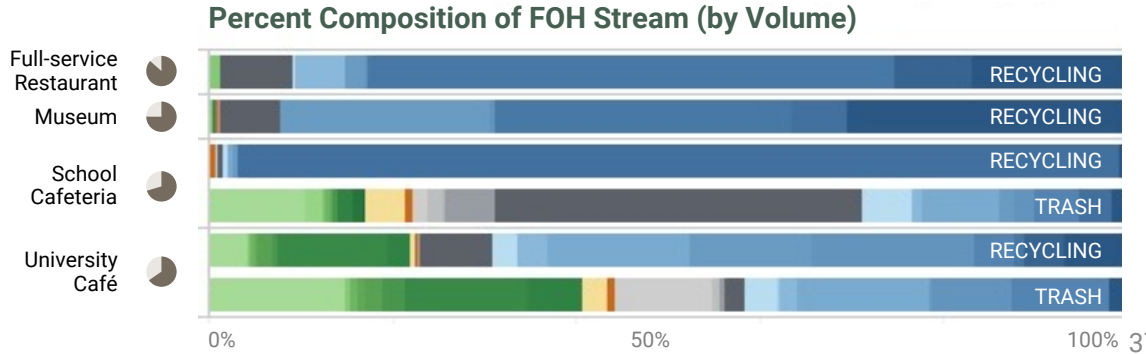
- Locations with high patron turnover (museum and café) collected the most contamination
- Contaminants were primarily high quantities of plastic cups, plastic utensils, plastic bags, and residue



Venues performing well in framework have little to zero food scraps in FOH recycling streams. FOH trash streams contained sizable amounts of food scraps and compostable items

- Recycling streams were primarily contaminated by liquids, suggesting that individuals don't consider dumping liquids into compost before disposing of liquid containers
- Higher scoring venues, however, show reduced contamination in recycling streams
- University café had highest percentage of food scraps (including liquids) and highest percentage of compostable items in FOH trash. By improving upon framework attributes, café may improve diversion to the correct bin

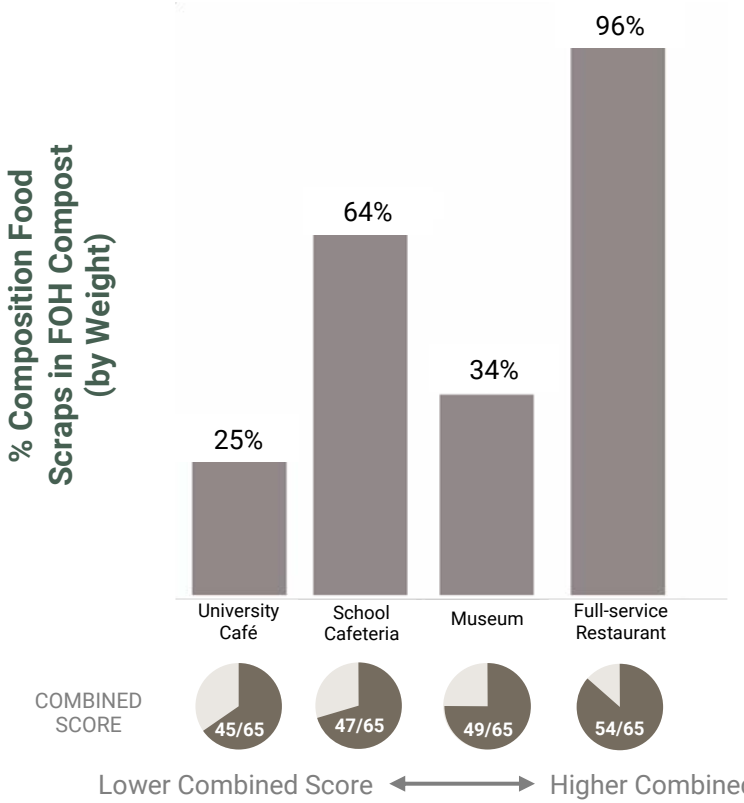




KEY LEARNINGS

FROM CHICAGO CASE STUDY

Evaluating Hypothesis 1: Adoption of Compostables will Increase Food Scrap Capture



PRIMARY FINDING

- Food scrap capture in FOH compost was found to trend higher at venues with stronger adoption of compostable foodservice items
- Relatively high % of food scrap in school compost stream may be influenced by exceptionally strong "People" dimension

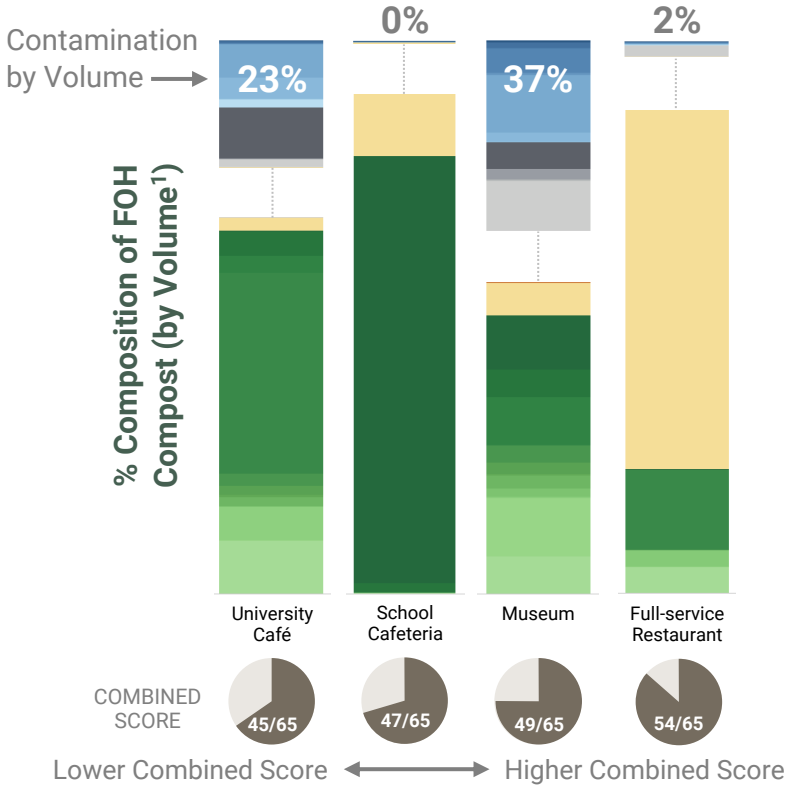
CONCLUSIONS

- Findings suggest that venues implementing FOH composting with compostable foodservice packaging, under the right operating conditions, should be expected to collect more food scraps in Front of House compost streams*
- Findings suggest high likelihood of a strong positive correlation between compostable foodservice items and rates of FOH food capture, though individual attributes likely have significant influence

** Adoption of compostable items defined by operating conditions as outlined in 4-Dimensional Framework*

Evaluate Correlation

Evaluating Hypothesis 2: Adoption of Compostable Foodservice Packaging will Result in Less Contamination



PRIMARY FINDING

- Contamination levels generally trend lower with stronger adoption of compostable foodservice items
- Much of Museum's contamination was likely non-compostable substitutes for compostable items ordered but not received due to supply chain disruptions

CONCLUSIONS

- Likely a significant positive correlation between higher degree of adoption of compostable foodservice items and higher FOH food capture[2]
- Much of Museum's contamination likely from procured compostables that were substituted with non-compostable items due to supply chain disruptions
- Specific underlying attributes can have outsized impacts on contamination. For example, this phenomenon is likely observed with the presence of the School Cafeteria Green Team

Recyclables | Trash | Liquids | Food Scraps | Compostable items

1) Represented here by volume as composters frequently measure contamination by volume
2) Adoption of compostable items defined by operating conditions as outlined in 4-Dimensional Framework

Key Study Findings & Insights

The following summary highlights how the findings from the four venue sorts relate to the study objectives.

		KEY INSIGHTS
HYPOTHESIS 1	**COMPOSTABLES & FOOD CAPTURE** *Venues that adopt compostable foodservice packaging under the right operating conditions should be expected to capture more food scraps in the Front of House compost stream*	▸ Across venues sampled, food scrap capture in FOH compost trended higher at venues with higher levels of best practice operating conditions[1] ▸ Findings suggest that properly managed Front Of House waste streams would be expected to contain more food than packaging
HYPOTHESIS 2	**COMPOSTABLES & CONTAMINATION** *Venues that adopt compostable foodservice packaging under the right operating conditions should be expected to have less contamination in Front of House compost streams*	▸ Across venues sampled, contamination levels trended lower in FOH compost from venues with higher levels of best practice operation conditions[1] ▸ Findings suggest that properly managed Front Of House waste streams may be expected to contain lower levels of contamination

1) Best Practice conditions as described in the 4-Dimensional Framework

Learnings & Recommendations for Sampling

Based on experiences of the Chicago CompostAble project, the Project Team has refined the methodology with recommendations to optimize data in future sorts

- Venues faced difficulty depositing bags of material into the correct containers. Bags required manual individual observation to find sticker labels and confirm by contents, not by container.
- Some venues, like the museum and university, appeared to only place 1-2 bags in the 32-gallon containers. Lack of compaction potentially caused lighter samples.
- The 32-gallon containers likely limited the size of the samples, especially for trash and recycling. Container size must align with bag size used by venues - minimum of 65 gal recommended for Trash & Recycling.

- Provide labels, tape, or stickers to venue staff to label bags. Redundancy of labeled bags and containers helps prevent cross stream confusion and mis-sorting.
- Ensure venue is following the provided source separation and labeling protocols. Some venues may have been confused by FOH vs. BOH and added bags of material based on the stream alone.
- Ideally, project staff should visit venue site after the samples have been generated to ensure the correct streams have been collected. Alternatively, ask venue staff to send pictures of the containers with material.

NEXT STEPS

Next Steps: A Call to Action

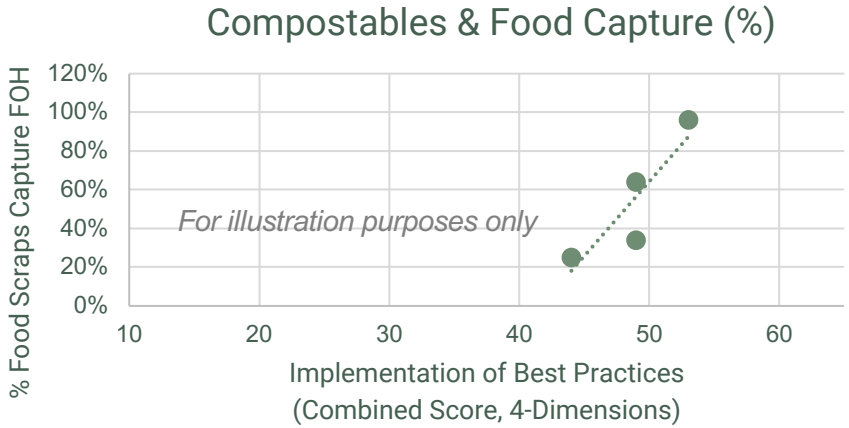
- The CompostAble Chicago project represents an important step toward better understanding the role compostable items can play in facilitating FOH composting
- Results from the case study suggest venues implementing best practices for FOH composting should be expected to capture more food and less contamination. However, additional data points should be sampled to evaluate statistical correlations

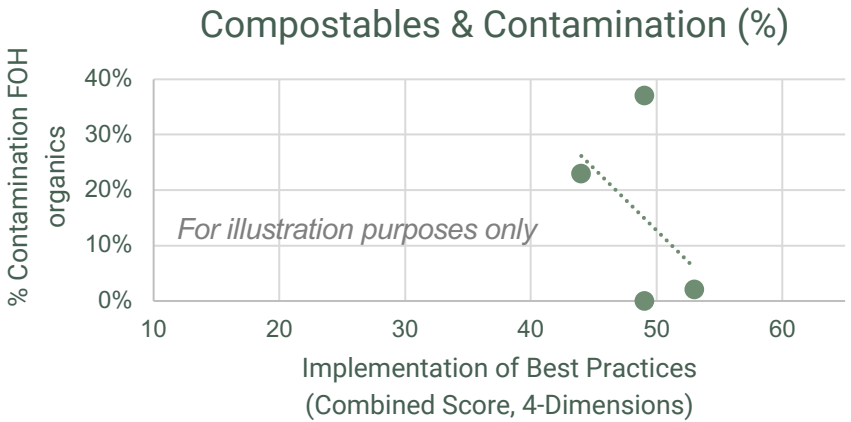
FUTURE STUDIES SHOULD

- Identify, study, and gather data related to performance
- Capture data from venues using few / no compostable foodservice items, and contrast against venues with high use of compostable items
- Seek “pre-” and “post-” sampling opportunities via programs where compostable will be rolled out
- Seek venue “pairs” where specific factors such as “People” and “Operations” are held constant, but use of compostable items is different (i.e., different locations of same chain, different cafés on same campus, etc.)

Next Steps: Developing a Statistical Correlation

- This study's approach and methods should be applied to additional venues in order to link how operating conditions impact the FOH compost streams
- Future studies will contribute to a body of data that can facilitate statistical evaluation of correlations. With a larger sample size, including variation in the degree of compostable foodservice packaging implementation (High vs Low), these variable cases should illustrate stronger patterns
- The correlation of individual venue attributes to both food scrap capture and contamination should be studied to enable refinement of the framework generally, and inform weighting approaches





COMPOSTABLE CHICAGO

Summary of Outcomes

This study has successfully:

- Demonstrated a replicable research approach that can shed insight into the relationship between use of compostable packaging, food waste capture, and levels of contamination
- Provided an organized framework by which composting operators can evaluate a foodservice venue to gauge how thoroughly and effectively compostable foodservice items are being utilized
- Implemented a multi-venue waste study, with results suggesting that with stronger operating conditions and best practices for compostable foodservice items, higher percentages of food scraps might be captured relative to packaging, and with low levels of contamination
- Developed a methodology by which a venue's waste stream can be characterized and quantify the contents of a foodservice venue's waste streams, including the contents of the Front of House organics stream
- Articulated a pathway by which to enable consistent and repeatable data collection over time through repeated sampling
- Presented a vision for future studies that will provide the level of data needed to evaluate the correlations in a statistical way

07

APPENDICES

APPENDIX A

VENUE PROFILES & SORT DATA

Venue Sort Data Summary

Venues ranged in the sample weights provided and sample streams

- Total amount of material sorted: 1,479 lb
- Total volume sorted: 1,672 gallons
- Number of streams sorted: 18

Venue	Volume (gal)	Weight (lb)
Full-Service Restaurant	365.9	652.3
Museum	299	218.5
School Cafeteria	659.1	543.2
University Café	348	144.6
Total	1,672	1,479.3

Venue	Stream	Volume (gal)	Weight (lb)
Full-Service Restaurant	BOH Compost	59.5	202.2
	BOH Trash	165.1	160.9
	FOH Compost	46.4	163.4
	FOH Recycling	95	125.7
Museum	BOH Trash	42.9	23.8
	FOH Compost	163.7	149.9
	FOH Recycling	92.5	44.8
	FOH Trash	N/A	N/A
School Cafeteria	BOH Compost	12.8	76.9
	BOH Trash	84.3	35.9
	FOH Compost	264.6	271.8
	FOH Recycling	171.2	57.8
	FOH Trash	126.3	101.0
University Café	BOH Compost	37.8	36.6
	BOH Trash	103.7	42.5
	FOH Compost	59	21.6
	FOH Recycling	90.6	22.7
	FOH Trash	57	21.2

Venue 1 Profile, Full-Service Restaurant

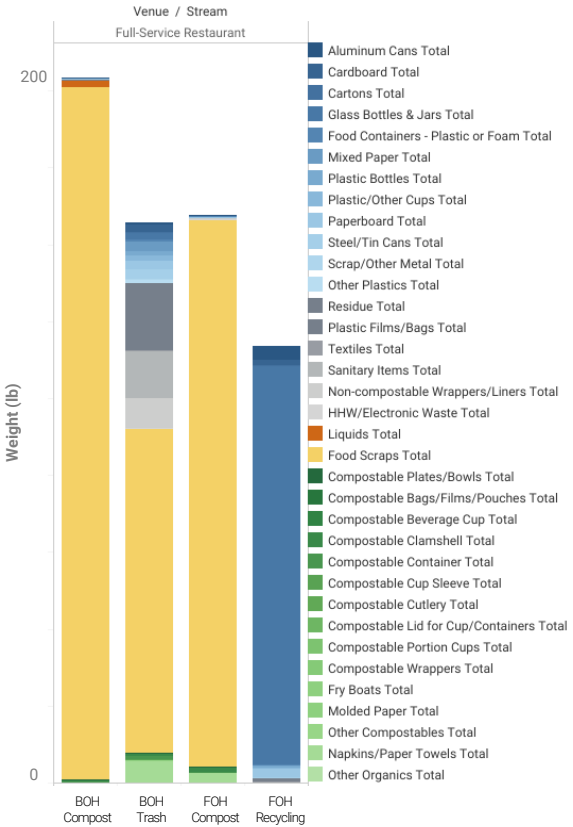
Back of House collection only, mix of reusable dishes / utensils and compostable items

- Total amount of material sorted: 652.4 lb
- Streams sorted: FOH Compost, BOH Compost, BOH Trash, and Recycling
- Venue does not collect material in the FOH Trash; materials disposed of by customers are collected by staff and disposed of in BOH
- Venue provides customers with certified compostable foodservice items, like straws, and reusable dishware / silverware

Compostable Foodservice Items
Bag / film / pouches
Beverage cup
Clamshell
Container
Cup lids
Cup sleeve
Cutlery
Napkins
Plate / bowl
Portion cup
Straws

Venue 1 Sort Results, Full-Service Restaurant

	BOH Compost (lb)	BOH Trash (lb)	FOH Compost (lb)	FOH Recycling (lb)
Aluminum Cans Total	0.0	0.5	0.0	3.9
Cardboard Total	0.0	2.1	0.0	1.4
Cartons Total	0.0	0.3	0.0	0.0
Compostable Bags/Films/Pouches Total	0.0	0.0	0.0	0.0
Compostable Beverage Cup Total	0.0	0.0	0.0	0.0
Compostable Clamshell Total	0.6	1.1	1.5	0.0
Compostable Container Total	0.2	0.6	0.0	0.0
Compostable Cup Sleeve Total	0.0	0.2	0.0	0.0
Compostable Cutlery Total	0.0	0.0	0.0	0.0
Compostable Lid for Cup/Containers Total	0.0	0.0	0.0	0.0
Compostable Plates/Bowls Total	0.0	0.0	0.0	0.0
Compostable Portion Cups Total	0.0	0.0	0.0	0.0
Compostable Straws Total	0.0	0.5	0.6	0.6
Compostable Wrappers Total	0.0	0.0	0.0	0.0
Food Containers - Plastic or Foam Total	0.0	0.9	0.1	0.0
Food Scraps Total	198.5	92.8	157.0	0.0
Fry Boats Total	0.0	0.0	0.0	0.0
Glass Bottles & Jars Total	0.0	1.8	0.4	114.5
HHW/Electronic Waste Total	0.0	0.0	0.0	0.0
Liquids Total	2.1	0.4	0.0	0.0
Mixed Paper Total	0.1	2.8	0.0	0.1
Molded Paper Total	0.0	0.1	0.0	0.0
Napkins/Paper Towels Total	0.0	6.5	2.7	0.1
Non-compostable Wrappers/Liners Total	0.1	8.6	0.5	0.0
Other Compostables Total	0.0	0.0	0.4	0.0
Other Organics Total	0.0	0.0	0.0	0.0
Other Plastics Total	0.0	0.9	0.0	0.2
Paperboard Total	0.0	2.6	0.0	2.6
Plastic Bottles Total	0.0	1.1	0.0	0.9
Plastic Films/Bags Total	0.0	13.6	0.0	0.3
Plastic Straws & Utensils Total	0.0	0.0	0.0	0.0
Plastic/Other Cups Total	0.1	1.4	0.1	0.2
Residue Total	0.4	5.5	0.0	0.9
Sanitary Items Total	0.0	13.6	0.0	0.0
Scrap/Other Metal Total	0.0	0.5	0.2	0.0
Steel/Tin Cans Total	0.0	2.6	0.0	0.0
Textiles Total	0.0	0.2	0.0	0.0



Venue 2 Profile, Museum

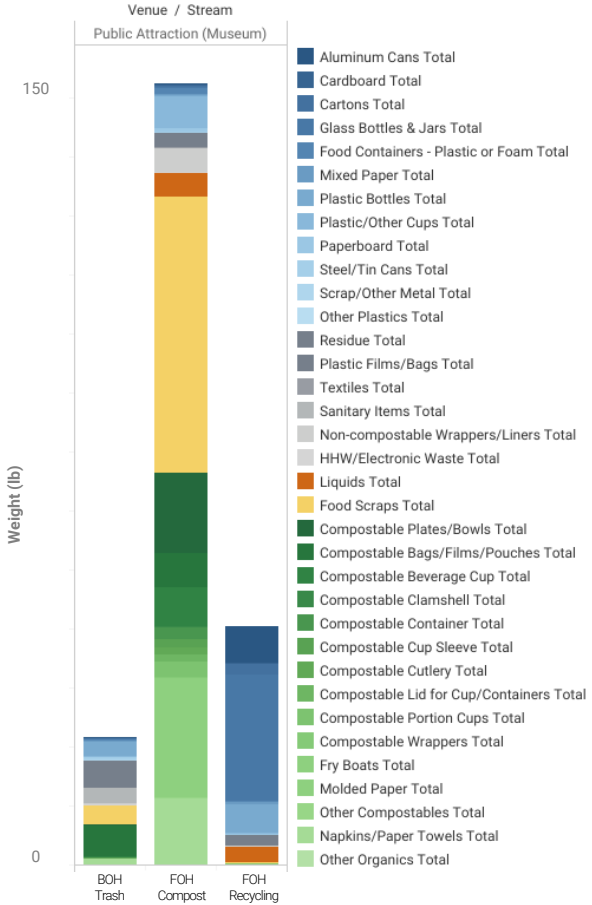
Public venue with high use of compostable items in Front of House

- Total amount of material sorted: 218.5 lb
- Streams sorted: BOH Trash, FOH Compost, and FOH Recycling
- Venue had a couple mix-ups in material stream collection:
    1. Labeled FOH compost bags were placed in the BOH compost containers, which took up the dedicated bin space that had been originally allotted for BOH compost. This led to no BOH compost being collected from the venue.
    2. No FOH trash was collected, which was discovered on the last day. The FOH trash containers that were believed to contain material from the Museum actually contained material from a different venue and were misplaced by the hauler when dropped off. This error was not caught early enough by the team. If it had been discovered earlier, additional efforts would have been made to re-collect that material.
- The absence of FOH trash encumbers the Project Team's ability to assess the FOH food scrap capture for this venue. Additionally, it limits the ability to assess compostable items that have been misplaced in the FOH trash stream, a measure that can only be determined for the FOH recycling stream

Compostable Foodservice Items
Bag / film / pouches
Beverage cup
Clamshell
Container
Cup lids
Cup sleeve
Cutlery
Napkins
Plate / bowl
Portion cup
Straws

Venue 2 Sort Results, Museum

	BOH Compost (lb)	BOH Trash (lb)	FOH Compost (lb)	FOH Recycling (lb)
Aluminum Cans Total	0.00	0.00	0.22	7.01
Cardboard Total	0.00	0.07	0.00	0.00
Cartons Total	0.00	0.00	0.40	2.12
Compostable Bags/Films/Pouches Total	0.02	6.02	6.50	0.00
Compostable Beverage Cup Total	0.00	0.00	7.32	0.15
Compostable Clamshell Total	0.64	0.00	0.00	0.00
Compostable Container Total	0.22	0.18	2.40	0.00
Compostable Cup Sleeve Total	0.00	0.00	1.52	0.00
Compostable Cutlery Total	0.04	0.00	1.34	0.04
Compostable Lid for Cup/Containers Total	0.00	0.00	1.23	0.00
Compostable Plates/Bowls Total	0.00	0.07	14.90	0.00
Compostable Portion Cups Total	0.02	0.00	2.98	0.09
Compostable Straws Total	0.02	0.00	0.13	0.00
Compostable Wrappers Total	0.00	0.00	0.00	0.00
Food Containers - Plastic or Foam Total	0.00	0.31	1.26	0.02
Food Scraps Total	198.50	3.73	51.59	0.00
Fry Boats Total	0.00	0.02	22.22	0.00
Glass Bottles & Jars Total	0.00	0.35	0.00	23.57
HHW/Electronic Waste Total	0.00	0.00	0.00	0.00
Liquids Total	2.07	0.00	4.63	3.09
Mixed Paper Total	0.07	0.29	0.20	0.62
Molded Paper Total	0.00	0.00	0.13	0.13
Napkins/Paper Towels Total	0.00	1.30	12.52	0.11
Non-compostable Wrappers/Liners Total	0.07	0.22	4.63	0.00
Other Compostables Total	0.00	0.00	0.15	0.00
Other Organics Total	0.00	0.00	0.00	0.00
Other Plastics Total	0.00	0.07	0.11	0.00
Paperboard Total	0.00	0.11	0.68	0.00
Plastic Bottles Total	0.00	2.45	0.00	5.38
Plastic Films/Bags Total	0.02	0.00	0.26	0.00
Plastic Straws & Utensils Total	0.00	0.02	3.73	0.15
Plastic/Other Cups Total	0.07	0.07	6.19	0.11
Residue Total	0.35	4.83	2.49	2.12
Sanitary Items Total	0.04	3.11	0.09	0.00
Scrap/Other Metal Total	0.00	0.00	0.00	0.07
Steel/Tin Cans Total	0.00	0.66	0.00	0.00
Textiles Total	0.00	0.00	0.00	0.00



Venue 3 Profile, School Cafeteria

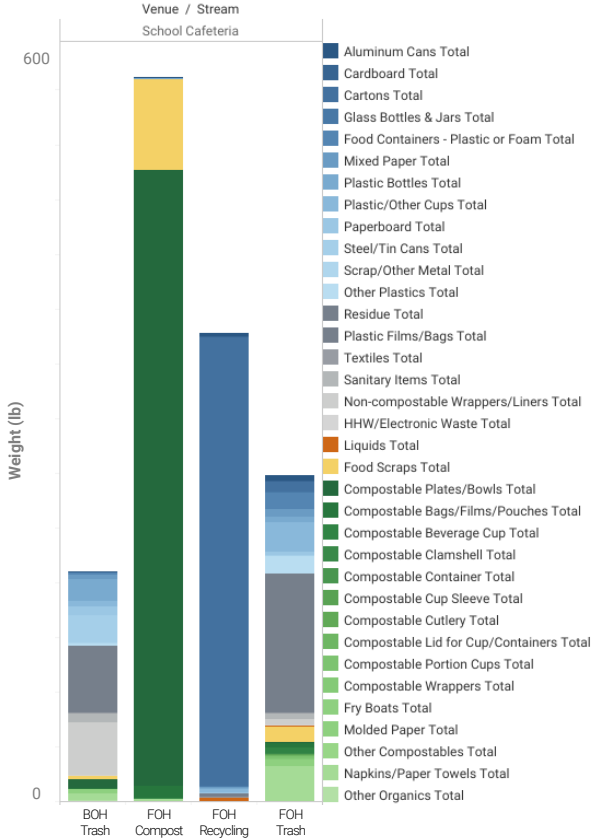
School cafeteria with limited compostable products but Front of House compost collection

- Total amount of material sorted: 543.2 lb
- Streams Sorted: BOH Trash, BOH Compost, FOH Trash, FOH Compost, and Recycling
- Cafeteria serves food on compostable trays which were stacked and kept segregated outside of the containers. This contributed to a high compostable product volume
- FOH compost was extremely clean with no visible contamination; virtually all material was comprised of food scraps and compostable packaging

Compostable Foodservice Items
Napkins
Plate / bowl (trays)

Venue 3 Sort Results, School Cafeteria

	BOH Compost (lb)	BOH Trash (lb)	FOH Compost (lb)	FOH Recycling (lb)
Aluminum Cans Total	0.00	0.07	0.00	1.59
Cardboard Total	0.00	0.09	0.00	0.00
Cartons Total	0.00	0.02	0.00	37.30
Compostable Bags/Films/Pouches Total	0.00	0.00	0.60	0.00
Compostable Beverage Cup Total	0.00	0.04	0.00	0.00
Compostable Clamshell Total	0.00	0.00	0.00	0.00
Compostable Container Total	0.00	0.00	0.00	0.00
Compostable Cup Sleeve Total	0.00	0.00	0.00	0.00
Compostable Cutlery Total	0.00	0.00	0.00	0.00
Compostable Lid for Cup/Containers Total	0.00	0.02	0.00	0.00
Compostable Plates/Bowls Total	0.00	0.44	95.99	0.00
Compostable Portion Cups Total	0.00	0.00	0.00	0.00
Compostable Straws Total	0.00	0.00	0.00	0.00
Compostable Wrappers Total	0.00	0.00	0.00	0.00
Food Containers - Plastic or Foam Total	0.00	0.18	0.00	0.04
Food Scraps Total	77.01	10.63	173.99	0.53
Fry Boats Total	0.00	0.37	0.00	0.00
Glass Bottles & Jars Total	0.00	0.00	0.00	0.00
HHW/Electronic Waste Total	0.00	0.00	0.00	0.00
Liquids Total	0.00	0.00	0.00	14.13
Mixed Paper Total	0.00	0.18	0.75	0.02
Molded Paper Total	0.00	0.00	0.00	0.00
Napkins/Paper Towels Total	0.00	1.61	0.49	1.12
Non-compostable Wrappers/Liners Total	0.00	2.31	0.00	0.00
Other Compostables Total	0.00	0.00	0.00	0.00
Other Organics Total	0.00	0.15	0.00	0.00
Other Plastics Total	0.00	0.75	0.00	0.22
Paperboard Total	0.00	1.10	0.00	0.00
Plastic Bottles Total	0.00	2.01	0.00	1.50
Plastic Films/Bags Total	0.00	5.53	0.00	0.09
Plastic Straws & Utensils Total	0.00	0.13	0.00	0.11
Plastic/Other Cups Total	0.00	0.73	0.00	0.44
Residue Total	0.00	1.32	0.00	0.60
Sanitary Items Total	0.00	4.08	0.00	0.02
Scrap/Other Metal Total	0.00	0.00	0.00	0.02
Steel/Tin Cans Total	0.00	3.73	0.00	0.00
Textiles Total	0.00	0.35	0.00	0.00



Venue 4 Profile, University Café

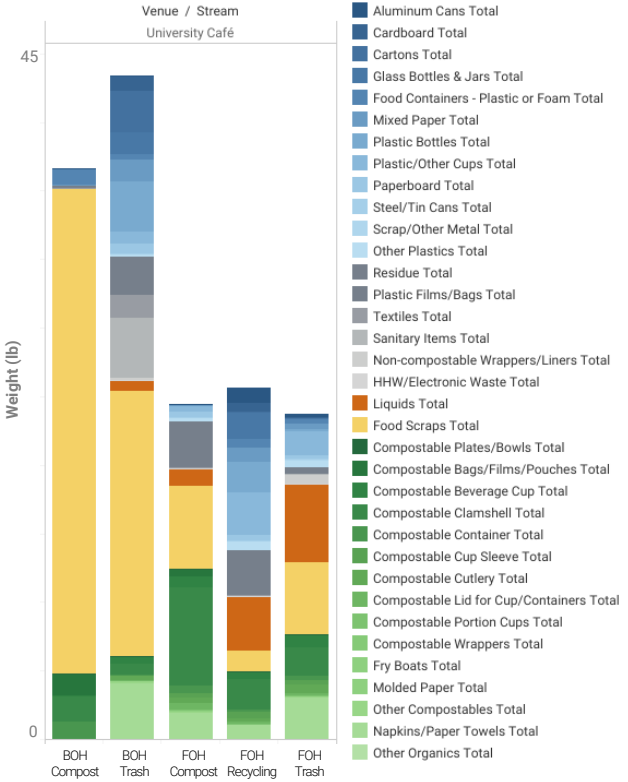
University quick service café uses mostly compostable foodservice items to serve meals

- Total amount of material sorted: 144.6 lb
- Streams sorted: FOH & BOH Compost, FOH & BOH Trash, and FOH Recycling
- Venue staff stated that they generate lower volumes of material. Containers were placed a week before the sort. However, this still did not produce full material stream samples
- Venue staff did not compact material within containers, possibly causing staff to assume they were full and not adding more material

Compostable Foodservice Items
Bag / film / pouches
Beverage cup
Clamshell
Container
Cup lids
Cup sleeve
Cutlery
Portion cup
Straws
Wrappers

Venue 4 Sort Results, University Café

	BOH Compost (lb)	BOH Trash (lb)	FOH Compost (lb)	FOH Recycling (lb)
Aluminum Cans Total	0.00	0.00	0.00	0.97
Cardboard Total	0.00	0.97	0.00	0.55
Cartons Total	0.00	2.60	0.04	0.02
Compostable Bags/Films/Pouches Total	1.41	0.00	0.46	0.00
Compostable Beverage Cup Total	0.00	0.53	0.66	0.49
Compostable Clamshell Total	1.65	0.64	6.35	1.94
Compostable Container Total	1.12	0.00	0.51	0.18
Compostable Cup Sleeve Total	0.00	0.04	0.26	0.37
Compostable Cutlery Total	0.00	0.29	0.37	0.20
Compostable Lid for Cup/Containers Total	0.00	0.00	0.37	0.15
Compostable Plates/Bowls Total	0.00	0.00	0.00	0.00
Compostable Portion Cups Total	0.00	0.00	0.00	0.00
Compostable Straws Total	0.00	0.00	0.02	0.07
Compostable Wrappers Total	0.00	0.00	0.11	0.00
Food Containers - Plastic or Foam Total	1.08	0.35	0.07	0.57
Food Scraps Total	31.24	17.04	5.36	1.34
Fry Boats Total	0.00	0.00	0.00	0.00
Glass Bottles & Jars Total	0.00	1.46	0.00	1.72
HHW/Electronic Waste Total	0.00	0.00	0.00	0.00
Liquids Total	0.00	0.73	1.08	3.48
Mixed Paper Total	0.00	1.34	0.02	0.88
Molded Paper Total	0.00	0.04	0.00	0.00
Napkins/Paper Towels Total	0.00	3.57	1.70	0.93
Non-compostable Wrappers/Liners Total	0.00	0.09	0.11	0.07
Other Compostables Total	0.00	0.22	0.11	0.07
Other Organics Total	0.00	0.00	0.00	0.00
Other Plastics Total	0.00	0.22	0.24	0.64
Paperboard Total	0.00	0.60	0.33	0.29
Plastic Bottles Total	0.00	3.24	0.00	1.98
Plastic Films/Bags Total	0.20	1.92	2.51	2.07
Plastic Straws & Utensils Total	0.00	0.00	0.00	0.04
Plastic/Other Cups Total	0.00	0.82	0.42	2.76
Residue Total	0.00	0.53	0.44	0.86
Sanitary Items Total	0.00	3.86	0.00	0.00
Scrap/Other Metal Total	0.00	0.00	0.00	0.00
Steel/Tin Cans Total	0.00	0.00	0.00	0.00
Textiles Total	0.00	1.50	0.00	0.00



Focus Materials in the FOH Compost Stream

Most commonly found compostable foodservice items in the FOH compost streams across all venues: clamshells, plates/bowls, and napkins/paper towels

Top three compostable items:

- Restaurant - clamshells, paper towels, and straws by volume and weight
- Museum – bags / films / pouches and fry boats, beverage cups 3rd by vol., napkins 3rd by weight
- School – primary compostable product, trays, were counted as plates / bowls
- University – clamshells and napkins by vol. and weight, wrappers 3rd by vol., cups 3rd by weight

	Full-Service Restaurant		Museum		School Cafeteria		University Café	
	Measurement FOH Compost		Measurement FOH Compost		Measurement FOH Compost		Measurement FOH Compost	
Compostable Materials	By Volume	By Weight	By Volume	By Weight	By Volume	By Weight	By Volume	By Weight
Clamshell	16.2%	0.9%	0.0%	0.0%	0.0%	0.0%	39.8%	29.4%
Plates/Bowls	0.0%	0.0%	10.7%	9.9%	85.1%	35.3%	0.0%	0.0%
Bags/Films/Pouches	0.0%	0.0%	5.5%	4.3%	1.7%	0.2%	5.1%	2.2%
Napkins/Paper Towels	4.3%	1.6%	7.3%	8.4%	0.4%	0.2%	10.2%	7.9%
Beverage Cup	0.0%	0.0%	9.5%	4.9%	0.0%	0.0%	3.4%	3.1%
Fry Boats	0.0%	0.0%	11.5%	14.8%	0.0%	0.0%	0.0%	0.0%
Container	0.0%	0.0%	3.7%	1.6%	0.0%	0.0%	2.5%	2.3%
Cup Sleeve	0.0%	0.0%	2.1%	1.0%	0.0%	0.0%	1.7%	1.2%
Wrappers	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	6.8%	0.5%
Straws	3.2%	0.3%	0.2%	0.1%	0.0%	0.0%	0.1%	0.1%
Lid for Cup/Containers	0.0%	0.0%	2.5%	0.8%	0.0%	0.0%	1.7%	1.7%
Other Compostables	1.1%	0.2%	0.2%	0.1%	0.0%	0.0%	0.4%	0.5%
Cutlery	0.0%	0.0%	0.5%	0.9%	0.0%	0.0%	0.5%	1.7%
Portion Cups	0.0%	0.0%	1.7%	2.0%	0.0%	0.0%	0.0%	0.0%
Molded Paper	0.0%	0.0%	0.2%	0.1%	0.0%	0.0%	0.0%	0.0%
Molded Paper	0.0%	0.0%	0.2%	0.1%	0.0%	0.0%	0.0%	0.0%

APPENDIX B

VENUE CHARACTERIZATION METHODOLOGY

1 Procurement

Framework for Evaluating Venues by Attributes Likely to Influence Contamination and Food Capture

Is the dining environment equipped with consistent, certified compostable foodservice packaging and minimal complicating factors that might increase the risk of contamination?

Primary Indicators	Characterization Guidelines Values scored 1 to 5 (5 represents more favorable system to maximize food scrap capture or minimize contamination risk)
NUMBER OF DISTINCT SINGLE-USE FOODSERVICE ITEMS *How extensively are single-use items utilized?*	Number is based on products in use at the venue at any one time. 5: 6 or fewer distinct single-use foodservice items 4: 7-11 distinct single-use foodservice items 3: 12-16 distinct single-use foodservice items 2: 17-21 distinct single-use foodservice items 1: 22+ distinct single-use foodservice items
PERCENTAGE OF SINGLE-USE FOODSERVICE PACKAGING THAT IS COMPOSTABLE *How thoroughly have compostable items been implemented?*	Count is based on purchased quantities of foodservice items 5: 95% (by count) of single-use foodservice packaging is Compostable. Very low hassle to sort. All foodservice packaging, if not reusable, is either compostable, or clearly distinguishable as recyclable. 4: 80-94% (by count) of single-use foodservice packaging is Compostable 3: 65-79% (by count) of single-use foodservice packaging is Compostable 2: 40-64% (by count) of single-use foodservice packaging is Compostable 1: <40% (by count) of single-use foodservice packaging is Compostable
PROPER PAIRING OF BUNDLED ITEMS *Are compostable items easily sorted from non-compostable items by patrons?*	Foodservice items are bundled when items that are manufactured separately are physically served together – often one attached to the other or one nested in the other. Examples include cup & lid; cup & straw; boat & liner 5: If/when multiple items are bundled, they are always intended for the same bin. For instance, a compostable cup has a compostable straw and compostable lid 4: There is 1 case when bundled items are not intended for the same bin 3: There are 2-3 cases when bundled items are not intended for the same bin 2: There are 4-6 cases when bundled items are not intended for the same bin 1: There are 7+ cases when bundled items are not intended for the same bin
LIMITED PREVALENCE OF NON-COMPOSTABLE SINGLE-USE ITEMS *Are non-compostable items minimized to reduce the chance of entering compost stream?*	Small, ubiquitous single-use items include condiment packets, condiment cups, straws, etc. 5: The venue has no small, ubiquitous single-use items that are intended for the trash. Any of these items that do exist are compostable 3: There is a mix of compostable and non-compostable ubiquitous single use items 1: Most of the small, ubiquitous single-use items should be disposed of in the trash

2 Operations

Framework for Evaluating Venues by Attributes Likely to Influence Contamination and Food Capture

Are staff knowledgeable about handling and sorting compostable items, and are they actively engaged in the management of streams?

Primary Indicators	Characterization Guidelines Values scored 1 to 5 (5 represents more favorable system to maximize food scrap capture or minimize contamination risk)
FOH STREAM MANAGEMENT *Does the facility actively sort or review FOH streams for contamination?*	5: Facility directly manages or controls material going into FOH collection containers 3: Facility occasionally monitors FOH composting stream and mitigate contaminants 1: Patrons directly load material into FOH collection containers with little to no monitoring by staff
MINIMIZATION OF OUTSIDE MATERIALS *Is there low likelihood of outside materials contaminating the stream?*	5: Customer population unlikely or not allowed to bring in / dispose of contaminants from outside into the venue (e.g., unlikely for customers to bring in items / packaging that would otherwise not be present at the venue) 3: Customers occasionally bring in / dispose of contaminants from outside into the venue 1: Customers regularly bring in / dispose of contaminants from outside into the venue
TARGETED PROGRAMS OR PROTOCOLS *Does the venue implement dedicated measures to improve food capture and implementation of compostable items?*	5: Venue aggressively utilizes dedicated resources or staff to improve patron participation or performance. Examples include educational/training programs, bin monitors, “green teams” 3: Venue moderately utilizes resources or staff to improve patron participation or performance 1: Venue does not utilize resources or staff to improve patron participation or performance
STAFF TRAINING *Are staff equipped to recognize and differentiate compostable vs. non-compostable products through effective and continual training, signage and waste sort set up?*	5: All venue staff receive formal training and guidance – beyond new hire training - related to identifying compostable items versus non-compostable products 3: Venue staff may informally receive information related to identifying compostable items versus non-compostable products 1: No venue staff receive any training and guidance related to identifying compostable items versus non-compostable products

3 Communications

Framework for Evaluating Venues by Attributes Likely to Influence Contamination and Food Capture

Do guests receive clear instruction in the dining environment regarding how to handle compostable and non-compostable foodservice packaging after use through messaging in the venue and on compostable items?

Primary Indicators	Characterization Guidelines Values scored 1 to 5 (5 represents more favorable system to maximize food scrap capture or minimize contamination risk)
LABELING *Is compostable foodservice packaging readily identifiable as such?*	5: All compostable foodservice packaging is clearly marked Compostable or Certified Compostable with printed words or recognizable images. 4: 75+% (by count) is clearly marked 3: 50+% (by count) is clearly marked 2: 25+% (by count) is clearly marked 1: <25% (by count) of the compostable foodservice packaging is marked as Compostable with printed words or recognizable images
PATRON MESSAGING *Do patrons have clear sorting guidance?*	5: Clear and ample signage that shows which foodservice packaging, in addition to food scraps, go into the compost vs. trash. Bin labeling / position is clear. Ideal signage has visuals, is color-coded, and has translation for multiple languages as context requires. 3: Some signage and/or mostly useful signage that directs customers to sorting foodservice packaging to bins. 1: Very little or no signage for directing customers to sorting foodservice packaging into the bins.
CULTURE & COMMITMENT *Does the venue embrace a commitment to principles of sustainability?*	5: Venue explicitly states and embraces a commitment to zero waste, circular economy, or directly related goals 3: Venue explicitly states and embraces sustainability generally, but does not specifically state goals related to waste 1: Venue has no indicated commitment to zero waste, circular economy, or other sustainability goals can be identified

4 People

Framework for Evaluating Venues by Attributes Likely to Influence Contamination and Food Capture

Do venue patrons have frequent exposure to the venue's guidance and communications? Do staff have extended experience and familiarity with operational practices, and are they used in targeted ways to improve program performance?

Primary Indicators	Characterization Guidelines Values scored 1 to 5 (5 represents more favorable system to maximize food scrap capture or minimize contamination risk)
MINIMAL PATRON TURNOVER *Are patrons consistently and repeatedly exposed to the venue's guidance, protocols & messaging?*	5: Almost all or all customers are repeat 3: About half of the customers are repeat 1: Very few of the customers are repeat (most customers are there for the first time)
MINIMAL STAFF TURNOVER *Does the venue benefit from knowledgeable and experienced staff?*	5: Almost all or all staff have been present 1+ year 3: About half of the staff have been present 1+ year 1: Very few of the staff have been present 1+ year, majority are recent hires

APPENDIX C

DETAILED LOOK AT THE COMPOSTABLE CHICAGO WASTE SORTS

Measuring Volume in Addition to Weight

CompostAble Chicago waste sorts measured materials by weight, but also captured data by volume and for some focus materials, by individual count

Why is measuring **weight** important to the project outcome?

- Determining quantities of materials by discrete categories is the goal for a waste characterization, and weight provides a useful standard by which to define and compare most material types in a stream. Weight is particularly useful for measuring trash streams and recyclables.

Why is measuring **volume** also important to the project outcome?

- For organics streams, understanding quantities in terms of volume is very useful. Food scraps are predominantly water and are exceptionally heavy by comparison to other materials in the stream such as compostable foodservice items or contaminants such as films, straws, or other light, low-density items. These materials are still significant to a composter, and are typically measured visually in incoming loads. For this reason, the CompostAble Chicago Project Team also captured volume data during the sorts.

Volume Measurement

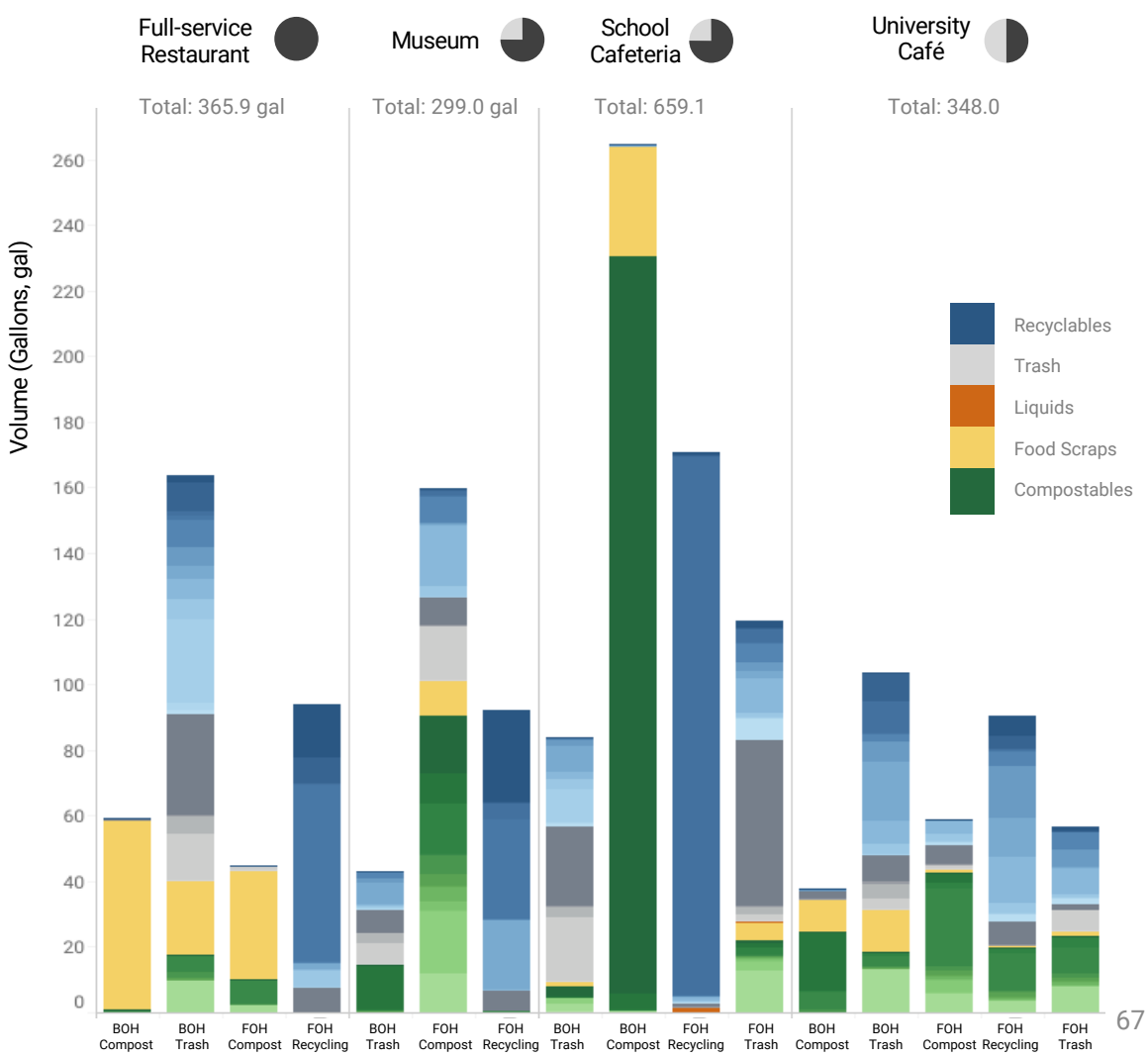
Volume of each sort category was measured for every material stream sample

For the buckets and totes used to sort and weigh materials, graduated measurement sticks were used to be able to consistently record the percentage full of material

% full x Container Volume (gal) =
Volume of Contents(gal)

Compostables comprised much higher fraction by volume than by weight in FOH compost streams

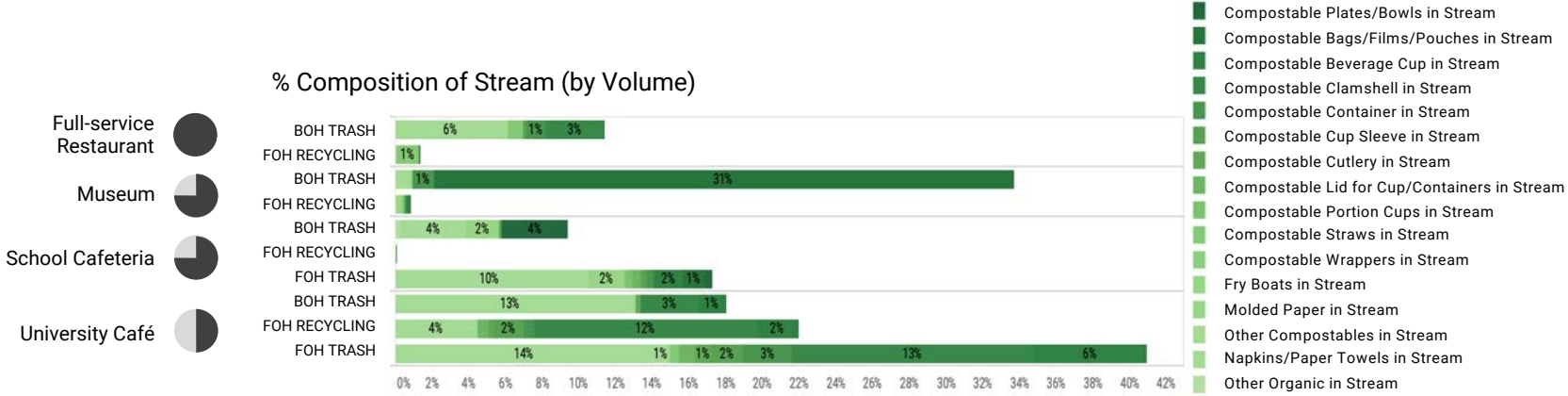
- The ratio of packaging to food waste is higher on a volume basis than by weight due to the lower average density of compostable packaging
- FOH compost loads are frequently visually inspected on a volume basis, which may overestimate the ratio of packaging to food scraps in comparison to a weight basis



Misplaced Compostables in Non-Compost Streams

Compostable foodservice items were measured across trash and recycling streams to evaluate how much of these materials were not captured for composting

- The highest rate of misplaced compostable items was found in the university café FOH trash stream (40%). Of this:
  - 14% were napkins / paper towels
  - 13% were compostable clamshells
  - 6% were compostable beverage cups



Sampling Categories- Compostables (1 of 2)

The table below illustrates the characteristic data that was collected for different types of compostable materials in the sorts. Sort approach was consistent across the three main streams including Recycling, Trash, Compost

MATERIAL	DESCRIPTION / EXAMPLES	WEIGHT (LB)	VOLUME (GAL)	COUNT (#)
CERTIFIED COMPOSTABLE FOODSERVICE ITEMS				
Beverage Cup	Cold or hot cups, paper and plastic	✓	✓	
Clamshell	Take-away containers	✓	✓	
Container	Other container types like soup cups	✓	✓	
Wrappers	Compostable wrappers (sandwich wrappers)	✓	✓	
Portion Cup	Small cups for sauces or sides	✓	✓	
Lid for Cup / Containers	Cold or hot cup lids, other lids	✓	✓	
Cup Sleeve	Sleeves	✓	✓	
Plate / Bowls	Compostable plates / bowls	✓	✓	
Bag / Films / Pouches	Compostable bags or pouches	✓	✓ (uncompressed)	
Straws	Straws	✓	✓	✓
Cutlery	Forks, spoons, knives, other utensils	✓	✓	✓

Sampling Categories- Compostables (2 of 2)

The table below illustrates the characteristic data that was collected for different types of compostable materials in the sorts. Sort approach was consistent across the three main streams including Recycling, Trash, Compost

MATERIAL	DESCRIPTION / EXAMPLES	WEIGHT (LB)	VOLUME (GAL)	COUNT (#)
ORGANIC MATERIAL				
Liquids	Liquid (drinks, soup, etc.) poured out into bucket	✓	✓	
Food Scraps	Includes pre- and post-consumer food waste	✓	✓	
Other Organics	Other organics like oil/grease, ash, fur, yard/plant waste	✓	✓	
FIBER & OTHER MATERIAL				
Napkins / Paper Towels	Fiber based towels or napkins	✓	✓	
Molded Paper	Molded paper trays, clamshells, cups	✓	✓	
Cardboard	Corrugated cardboard	✓	✓	
Paperboard	Paper or boxboard, includes paper plates that aren't certified compostable	✓	✓	
Mixed Paper	Includes newspapers	✓	✓	
Other Compostable Products	Items that do not fit into above categories like toothpicks, wooden stirrers, coffee pods	✓	✓	

Sampling Categories- Non-Compostables

The table below illustrates the characteristic data that was collected for different types of recyclable and non-recyclable materials in the sorts. Sort approach was consistent across the three main streams including Recycling, Trash, Compost

MATERIAL	DESCRIPTION / EXAMPLES	WEIGHT (LB)	VOLUME (GAL)	COUNT (#)
	RECYCLABLES			
Plastic Bottles	Includes resins #1 and #2-7	✓	✓	
Plastic Cups	Clear plastic and paper soda cups, non-compostable	✓	✓	
Other Plastics	Nonfood thermoforms, plastic lids	✓	✓	
Aluminum Cans	Beverage cans	✓	✓	
Steel / Tin Cans	Soup, tomato, fruit, or tuna cans, etc.	✓	✓	
Scrap / Other Metal	Other scrap metal that is not a container – foil / trays	✓	✓	
Glass Bottles & Jars	Beverage containers and jars	✓	✓	
Cartons	Aseptic / gable top cartons – milk, juice, broth	✓	✓	
	NON-CURBSIDE RECYCLABLES & TRASH			
Plastic Films / Bags	Shopping bags, Ziploc bags, cling wrap, plastic film shreds	✓	✓ (uncompressed)	
Food Container – Plastic or Foam	Styrofoam or plastic clamshells, food cups	✓	✓	
Plastic Straws & Utensils	Plastic forks, knives, spoons, straws	✓	✓	✓
Non-compostable Wrappers/Liners	Sandwich wrappers, pizza box liners, wax paper	✓	✓	
Sanitary Items	Gloves, hair nets, masks, cleaning wipes	✓	✓	
Textiles	Clothing, dish rags, etc.	✓	✓	
HHW / Electronic Waste	Batteries, appliances, pesticide bottles	✓	✓	
Residue	Fines, composites, non-recyclable or non-compostable material, bottle caps, chip wrappers, candy bar wrappers, etc.	✓	✓	
Garbage Bags (not included in analysis)	Liner bags that the material comes in	✓	✓	

Special thanks to the Waste Sort Team!

Sort Team

- Alex Baertschi, RRS
- Malik Coburn, Bright Beat
- Stephanie Katsaros, Bright Beat
- Meghan Wiebe, RRS

Volunteers

- Ali Leist, Pactiv Evergreen
- Benjamin Krumstok, IFSC & Composting Partners
- Jamie Brown, Eco-Products
- Kerry Devane, Eco-Products
- Peg Hoks, Georgia-Pacific
- Sarah Kircher, Pactiv Evergreen

Coordination & Provision of Sort Facility

- Joy Rifkin, LRS