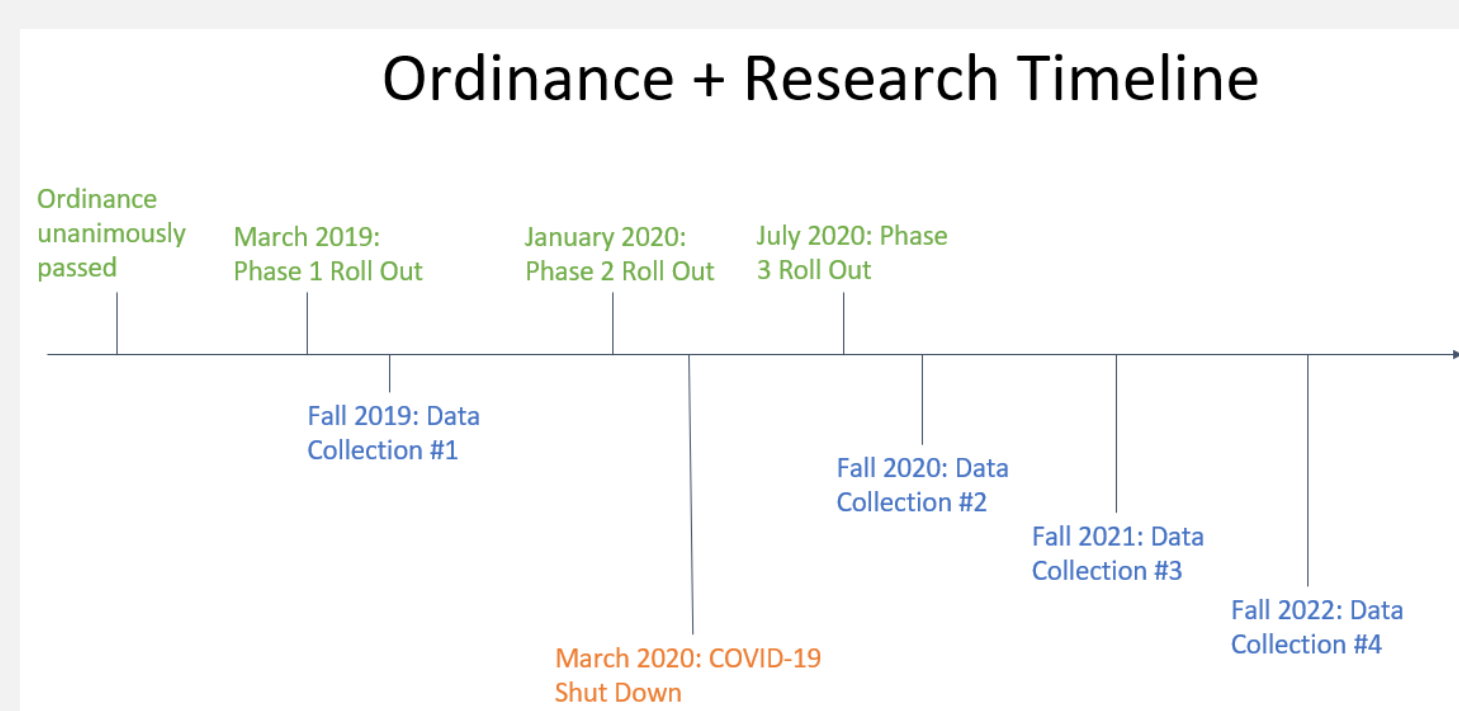


# CONDUCTING AND FOSTERING ZERO WASTE RESEARCH

JESSICA HEIGES  
UNIVERSITY OF CALIFORNIA CARBON NEUTRALITY INITIATIVE FELLOWSHIP  
2022-2023

## INTRODUCTION

Single-use disposable (SUD) foodware items (e.g., cups, plates, utensils) have a large carbon footprint. Roughly 50% of SUDs foodware used in the U.S. are made of plastic (Overbrook Foundation Inputs and Outputs, 2020). Fossil fuel is the base feedstock for plastic. The other 50% of SUDs foodware which are bio-based (e.g., corn stock) or metal-based, and have carbon-intensive supply chains, from their extraction, manufacturing, production, and transportation. After the foodware item is used once, it is composted, recycled, landfilled, or incinerated. The true end fate among material types and items is unknown. According to the EPA, in 2018, 81.5% of plastic cups and plates were landfilled. The other 19.5% were incinerated (EPA, 2020). Both landfill and incineration processes add to human-generated greenhouse gas emissions.



## Project Goals

This project has two goals, both aimed to better understand and support the reduction of SUDs foodware to improve consumption-based carbon contributions.

One goal is to collect follow-up data on SUDs foodware consumption and generation in the City of Berkeley. The City of Berkeley instated the **Single Use Foodware and Litter Reduction Ordinance** in 2019. This ordinance is the most comprehensive SUDs foodware reduction legislation in the U.S., aimed at phasing out fossil fuel-based SUDs foodware and even eliminating it in some consumption practices. Cities around the world are looking at it as a model ordinance to adopt in their jurisdictions. We are analyzing the economic, material, and social impacts of the ordinance through a four-year, pre-post quantitative observational survey of randomly selected food businesses in Berkeley and neighboring cities. Such an analysis will better equip the City of Berkeley and prospective municipalities to adopt, implement, and adjust policy to improve the SUDs foodware-related carbon emissions in their respective locales.

Another goal is to facilitate a group of undergraduate researchers in the **Zero Waste Lab** to collaborate with campus departments and community organizations to research, learn, and implement strategies to reduce waste generation and disposal. This is across all sectors (e.g., foodware, athletics, apparel, legislation, laboratories), with varying methodologies, objectives, and audiences. Collaboration and communication are the two cornerstones of this work.

All sections will be broken out by the two goals moving forward.

## Materials and Methods

### SUDs Ordinance Data Collection

This project included 28 volunteers collecting qualitative observational survey data collection at 146 registered prepared food vendors in Berkeley, Emeryville, Oakland, and Albany. We then analyzed the surveys collected this year in comparison to the two prior years (fall of 2019 and 2020).

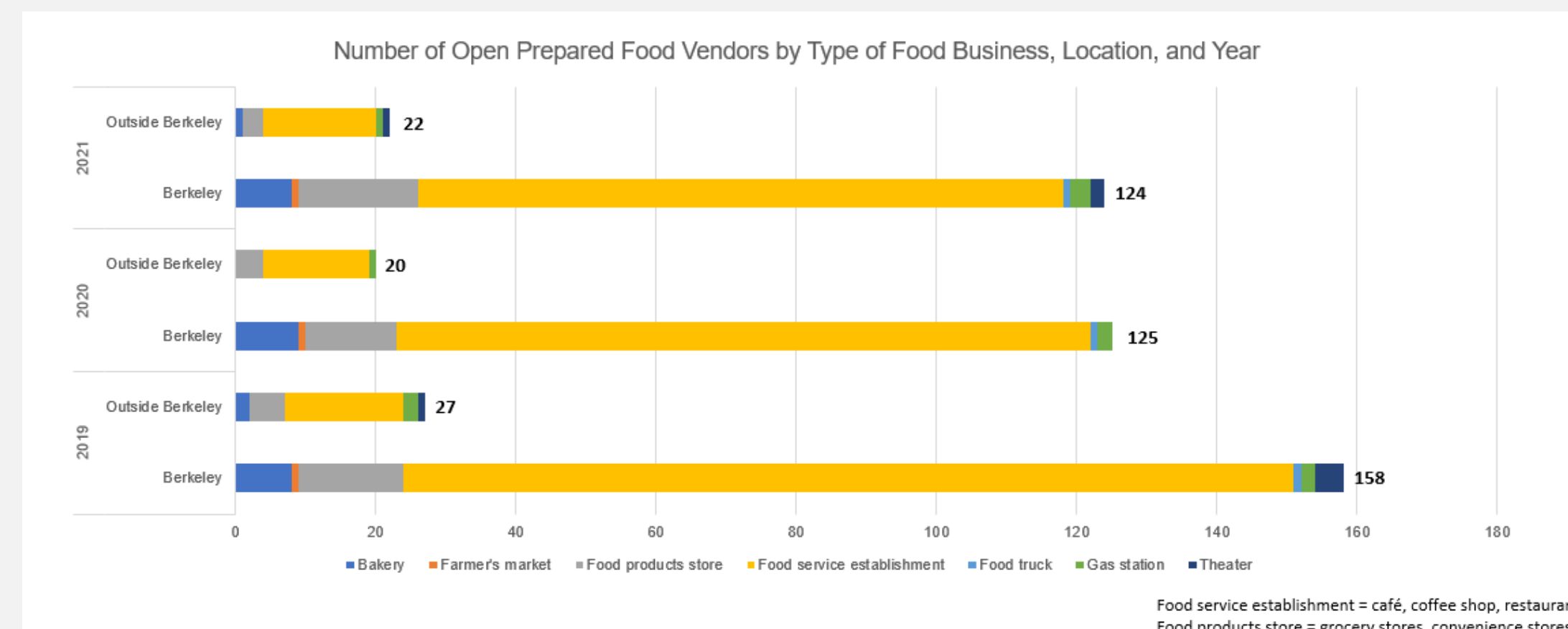
### Zero Waste Lab

This project focused on the semesterly Zero Waste Lab (ZWL): sourcing projects from campus departments and community partners, creating teams of 2-5 researchers per project, hosting weekly discussion sections and office hours, and facilitating the end-of-semester ZWL symposium to all departments, partners, and interested community members.

## Results and Outcomes

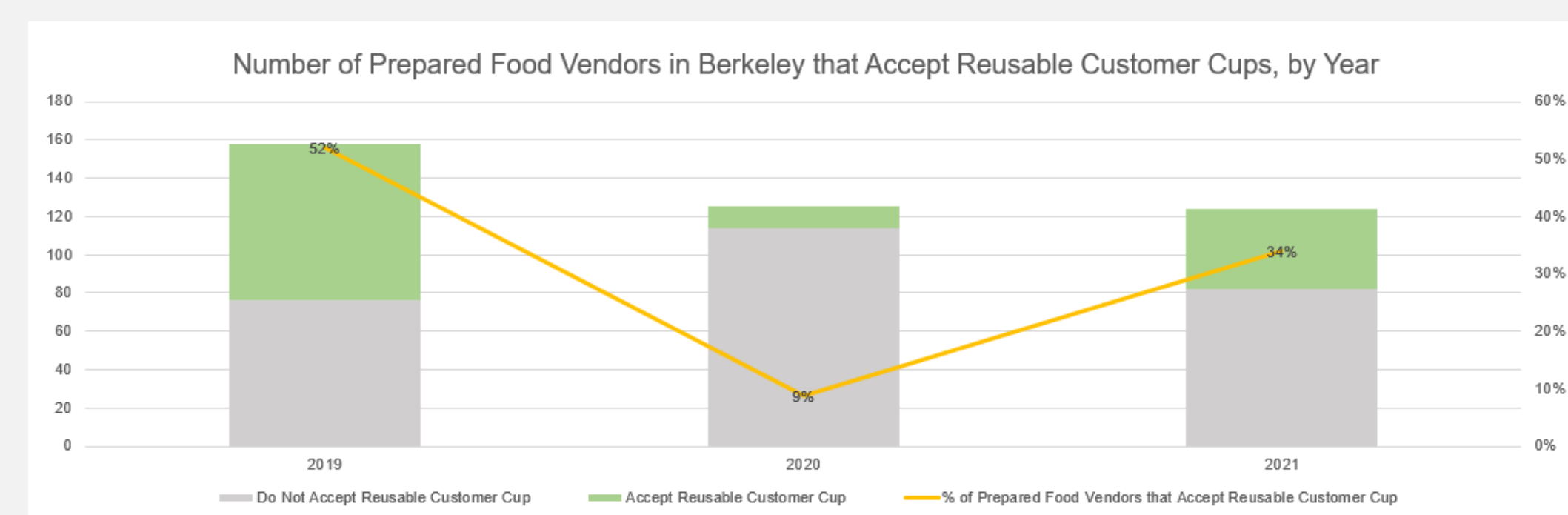
### SUDs Ordinance Data Collection

The total number of prepared food vendors open was stable from 2020 to 2021, after experiencing a 28% decline from 2019 to 2020. Berkeley specifically had a 26% decline during that time period.



The Ordinance is partially predicated on customers bringing their own reusable cup if they want beverages to go without using a disposable cup or paying the cup charge. Not all prepared food vendors accept a reusable customer cup, especially as Public Health Orders restricted such use in March 2020.

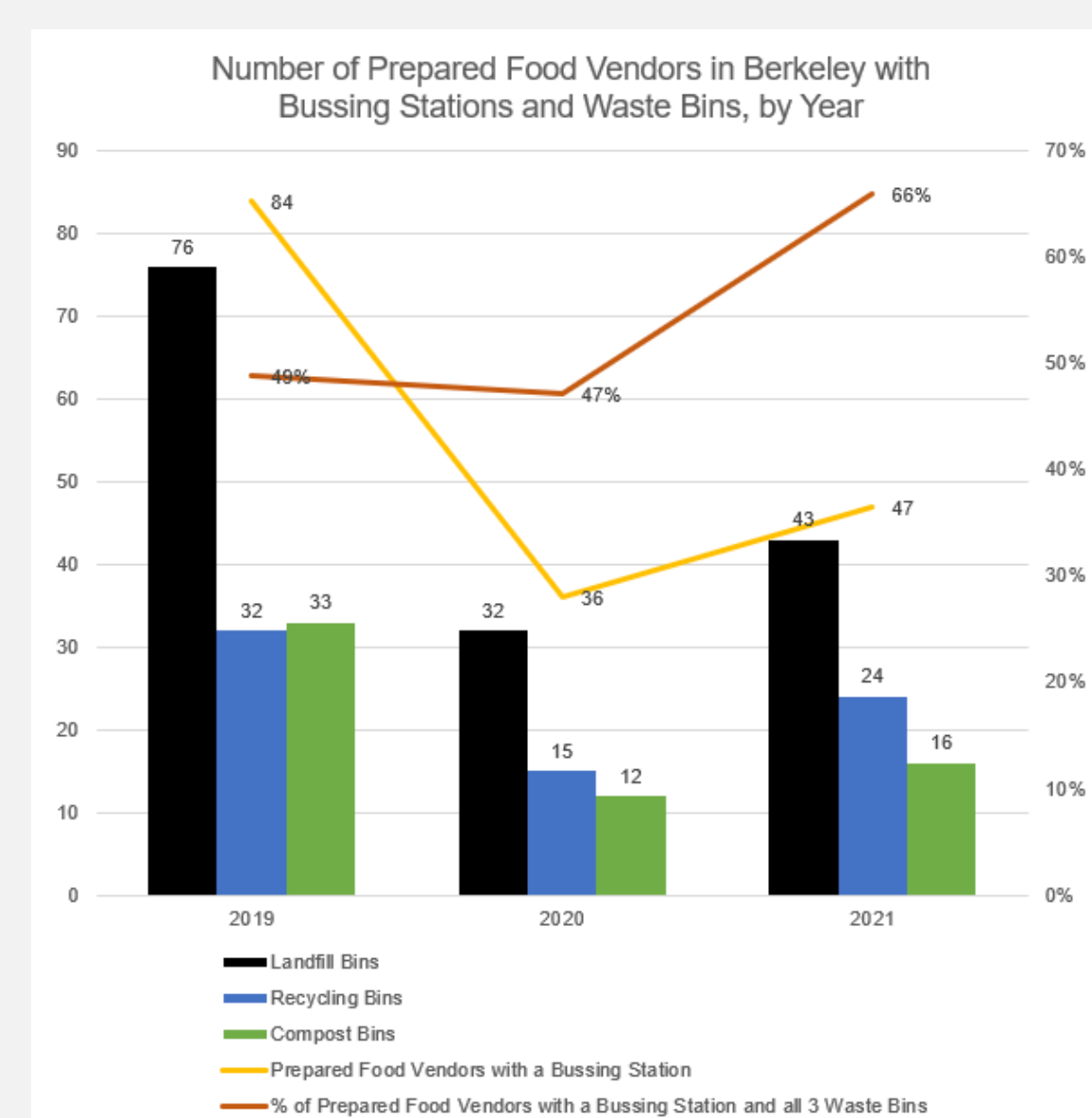
The percent of prepared food vendors accepting a reusable customer cup decreased from 52% in 2019 to 9% in 2020. In 2021 it rebounded a bit to 34%.



To abide by the *waste bin* mandate in the Ordinance, prepared food vendors with a bussing station are required to have all three waste bins (landfill, recycling, and compost).

The percent of prepared food vendors with a bussing station and all three waste bins was stable between 2019 and 2020 (49 and 47%) then rose to 66% in 2021.

The most common waste bin type is landfill. In 2020 and 2021, recycling is the second most common waste bin type and compost bins are least common.



### Zero Waste Lab

Over the course of the year, there were 62 undergraduate research working on 16 projects with two end-of-semester community-wide symposiums.

Below are a few presentation title slides from the Fall 2021 Zero Waste Lab Symposium



## Conclusions

### SUDs Ordinance Data Collection

- A "rebound" in Ordinance compliance from 2020 to 2021 is seen in many of the criteria for analysis!
- Biggest areas of opportunity:
  - Have more vendors accept a customer's personal cups
  - Have employees ask customers if their order is "for here or to go"
  - Have a self-serve station for foodware accessories
  - Not provide foodware accessories automatically
  - Have all three waste bins with a bussing station
  - Have more BPI Compostable cups and food containers
  - Have more compostable and recyclable wrappings
  - Have more reusable foodware for onsite dining
  - Inform customers on the Ordinance, especially the SUDs cup charge and proper waste sorting
- Share learnings on change management across prepared food vendors
- Only 8 prepared food vendors surveyed implemented the \$0.25 SUDs cup charge and they did not mention it through all required channels (e.g., menu, receipt) - in 2021, 4 also accept reusable customer cups
- There is time to act now to see changes before the final data collection, Nov-Dec 2022

### Zero Waste Lab

- Research projects with engaged project leads from the campus department or community organization are most successful in developing the students as researchers, meeting the project's goals, and applying learnings.
- Weekly ZWL meetings give time to build community within the entire cohort, create accountability on project progress, and share learnings and experiences across projects.
- The end-of-semester symposium allows the researchers to practice communicating scientific processes and analyses as well as disseminate learnings to relevant stakeholders.
- Having projects from campus departments and community organizations gives researchers options in what they will work on as well as bolster zero waste work in both communities.

## Future Goals

### SUDs Ordinance Data Collection

- Disseminate learnings: A core component of this research is to share the learnings with relevant stakeholders and other anti-SUDs advocates. This includes sharing the learnings with the City of Berkeley's Public Works Department, prepared food vendors in Berkeley, the National Reuse Network, and the Overbrook Foundation. We also plan to create a practitioner's toolkit so any local activist or politician can quickly launch an anti-SUDs campaign. Finally, we are writing a few publications (open accessed peer-reviewed and non-peer-reviewed) as well as speaking at a few events to equip audiences with data to make informed decisions.
- Our final (fourth) annual data collection will be next Fall (2022). This will include another round of recruiting volunteers, training them, and facilitating their data collection. Data analysis will occur the following Winter and Spring (2022).

### Zero Waste Lab

- Institutionalize the Lab: The goal is that the Lab is not reliant on a single person, so every year the Lab will have two undergraduates that will co-facilitate the Lab. They will have official roles on campus and will be paid for their contributions.
- Projects: The Lab will continue to partner with campus departments and community organizations to provide research support in zero waste initiatives. The Lab will seek diverse partners as well as strengthen healthy partnerships.
- Student Development: A pillar of the Lab from the beginning was focusing on student development. These skills include research, project management, collaboration, communication, and conflict resolution.
- Share Learnings: An important area of development is expanding where, who, and to whom the learnings are disseminated. The Lab seeks to make this information more accessible so any person in need of such data and/or analyses can obtain them.

## Acknowledgements

Ecology Center, Professor Kate O'Neill, Zero Waste Lab (co-facilitators Kathryn Wilson and Grace Martin as well as all the ZWL researchers and partners), campus supporters of our initiatives (Student Environmental Resource Center, Office of Sustainability, GreenLabs, Housing and Dining Sustainability), data collectors, and, of course, the Carbon Neutrality Initiative Fellow team

## Literature Cited

EPA. (2020). Nondurable Goods: Product-Specific Data. United States Environmental Protection Agency. Retrieved from <https://www.epa.gov/facts-and-figures-about-materials-waste-and-recycling/nondurable-goods-product-specific-data#PlasticPlatesandCups>.

Overbrook Foundation. (2020). Overbrook Foundation Inputs and Outputs.