

S U S T A I N A B L E L A F A Y E T T E

Leading the Way Towards a Sustainable Community



RESIDENTIAL WASTE AUDIT REPORT

SPONSORED BY REPUBLIC SERVICES

PREPARED BY BEN WEINTRAUB - SUMMER INTERN

August 2014

SUMMARY

SUMMARY OF RESEARCH:

- Conducted 20 waste audits of single-family homes between July 3rd and August 17th
- Searched for typical, non-environmental, families to participate.
- Household size ranged from 2-6 people.
- Audit involved completely sorting through and weighing contents of blue and brown/burgundy bin and visual inspection of green bins.

OVERALL FINDINGS:

- The average garbage (not recycled) per person was 5.8 pounds.
- A full 57% of the contents of the blue garbage bins could have been recycled!

BLUE BIN FINDINGS:

- 43% of the waste (by weight) inside the blue trash bins was actual trash
- 44% of the waste (by weight) inside the blue trash bins could have been composted. The most common compostable materials found included:
 - Compostable papers: paper napkins, paper towels
 - Food scraps: cornhusks, banana peels, vegetable stems
 - Actual food items: Fruits, breads, meats, cheeses
- 13% of the waste inside the blue trash bins could have been recycled (Clean papers, cardboards, metal cans, firm plastics, glass bottles)
- 4/20 homes had Hazardous Waste materials in their garbage (paints, batteries, phones and other electronics).

BROWN/BURGUNDY BIN FINDINGS:

- The recycle bins had a 7% contamination rate (by weight).
- Plastic bags and other soft plastics were the most common contaminant within the recycle bins. Other common contaminants found in the recycling included paper towels (and other dirtied paper products) and styrofoam.
- Recycling contamination varied wildly! One family was over 40% and five families didn't have any contamination at all.

GREEN BIN FINDINGS:

- Just 3/20 homes used the [food scrap recycling program](#).
- None of the 20 homes placed any kind of compostable papers or cardboards into their green bins.

INTRODUCTION

In the summer of 2013, Sustainable Lafayette, “a grassroots non-profit corporation that is working to transform Lafayette into a highly sustainable community” began the Recycle Lafayette Campaign. The goal of Recycle Lafayette is to reach a 75 percent waste diversion rate in the city, meaning only a quarter of the city’s waste would end up sitting in landfills. If Lafayette were to reach this goal a full three quarters of materials would be recovered for recycling and composting. Lafayette is currently at about a 66 percent diversion rate. The Recycle Lafayette campaign is targeting local businesses, schools, multifamily units and single-family homes to improve waste diversion by 9 percent in the next 2 years.

During the first summer of the campaign, Sustainable Lafayette interns targeted Lafayette business to improve recycling rates. Interns learned from businesses having success with composting and recycling (such as [Metro](#) and [Clocks](#)), enrolled businesses in the [free commercial food recycling project](#), and tried to work through the challenges of recycling and composting in busy restaurants and shopping centers. During the school year, several board members worked in the local schools to improve recycling education, sorting procedures and to reduce hot lunch packaging waste.

Although there is still significant work to be done to improve waste diversion in businesses and schools, Sustainable Lafayette decided to dive deeper into the residential side of the waste stream this summer. Previously, Sustainable Lafayette had assumed that most families knew about basic recycling. The first paragraph on the residential portion of the Recycle Lafayette webpage states, “You’re probably already doing great placing newspapers and wine bottles or soda cans into recycling.” Instead of focusing outreach efforts on simple recycling, Sustainable Lafayette’s big push to increase the diversion rate has been with composting. As the website says, “The Best Thing You Can Do: Recycle Your Food Scraps...Roughly 50% of the garbage we throw away is compostable and could go in your green yard waste bin and get turned into compost.” ([Recyclelafayette.org/residencial](#), August 2014) Making food scrap recycling the focus of residential outreach is based on conversations with Rebecca Jewel, the Waste Management Recycling Program Manager at the San Leandro Transfer Station as well as independent online research. However, Jewel’s observations and the other research done was not gathered directly from Lafayette nor was it very current. This summer, the Recycle Lafayette Campaign gathered localized, up-to-date facts about residential recycling to better tailor further outreach and educational efforts.

Working with Republic Services, the Sustainable Lafayette intern conducted 20 waste audits on single-family homes. The single-family residential waste audit project was meant to address the following questions. Is focusing on composting the most impactful strategy for increasing residential waste diversion rates? Are Lafayette residents using the green yard waste bins for food scraps and other compostable items from the kitchen? Do Lafayette residents recycle basic items like newspapers, glass bottles and metal cans effectively? What other major sources of contamination are there in a typical Lafayette household’s waste bins? Is Household Hazardous Waste being disposed of properly?

This report includes a summary of the methods, challenges and limitations of the single-family waste audit research project. It also outlines the results of the waste audits and a few recommendations for further action.

METHODS

Sustainable Lafayette's summer intern, Ben Weintraub and Sustainable Lafayette's co-president, Steve Richard emailed and called family friends to participate in the study (see recruitment email in the Reference section). They made sure that the participants knew that the information collected would be kept completely anonymous. Together, they reached out to about 40 families but only got responses from about 20. Many Lafayette families go on long vacations during the summer and were hard to track down. Others just did not respond to emails. Weintraub and Richard decided to avoid reaching out to Sustainable Lafayette board members at first in an attempt to get more of an "average" Lafayette family waste stream. They also tried to target larger families who presumably would have more waste to study. By the middle of the summer, Richard reached out to Sustainable Lafayette's facebook group and wrote in the Sustainable Lafayette newsletter group promoting the project. Unfortunately, there was a miss print of contact information on both the facebook post and in the newsletter. Therefore, no data was collected from houses directly in the Sustainable Lafayette network. All trash researched in this study is from families not known to be particularly environmentally conscious.

After getting an email or phone call reply from a family, Weintraub arranged to come by the family's house the day before their garbage would be picked up. Ideally, the family put out all of their garbage for that week.

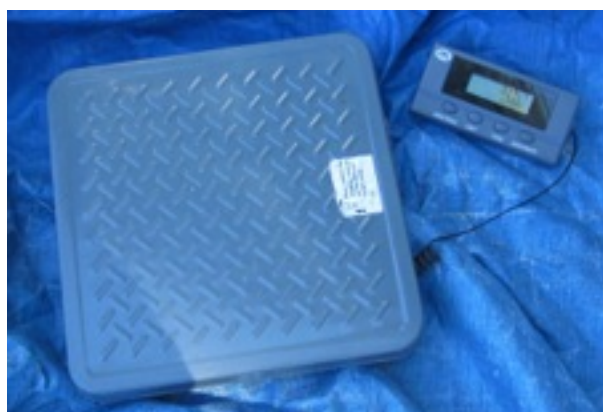
Weintraub used a ground scale (Picture 1), 4 laundry baskets of approximately the same size and weight (Picture 2), a tarp and gloves. After laying out the tarp on the family's driveway, Weintraub sorted through the brown recycling bin placing cardboard, mixed paper, metal, glass, recyclable plastic and non-recyclables in separate laundry baskets. The volume of the materials was estimated based on how much of a laundry basket each category took up. Each laundry basket full of materials was then weighed in pounds. The approximate weight (2.4 lbs) of each basket was later subtracted off. The intern then noted some of the items in each category, mainly focusing on the contaminants (what was not supposed to be in that bin).

A similar process was repeated for the blue trash bin. Items were separated as actual trash, compostable items and recyclable items. They were then placed into the appropriate laundry basket. Each category was given an estimated volume and weighed out on the scale. The types of items placed in each category were logged.

Although a similar sorting process for the green waste bin was attempted, this process was soon abandoned. Pulling everything out of the green bin was very messy, especially on windy days. Full yard waste bins are also extremely heavy, and sorting through all the bin's contents proved

to be exhausting and time consuming. After giving up on a full audit of the green bins, these bins were inspected from the top keeping everything in the bin. If a family had food scraps or other non-yard waste items in their green bin, this was recorded. The approximate fullness of the bin was also written down.

If the family was home and expressed interest, Weintraub would show the family the different categories he had sorted. He would explain why certain items went in certain bins as well as the importance of composting. With almost all of the families, Weintraub would follow up with an email seeing if they had any questions and giving them a report of his findings (see example in the Reference section). The families were often given links to the Recycle Lafayette page. Families were generally appreciative of the results. Many were surprised about all of the items that could go in the green bin.



Picture 1 The ground scale used in all 20 residential waste audits



Picture 2 A typical set up of a waste audit with the tarp in a driveway, the four laundry baskets and the scale.

CHALLENGES & LIMITATIONS

Estimating the volume of the recycling and trash bins by using the laundry baskets as a reference is fairly inaccurate for these small-scale waste audits. While estimating one full basket or a half a basket is pretty easy, estimating the volume of very small amounts is difficult without other reference points. Often times there were just one or two items in a single category. If there was one small item it was estimated at a volume of 0.01. If there were a couple more small items, they were estimated at a volume of 0.1. These evaluations of volume are certainly inaccurate but serve as a very rough mode of comparison. If doing more single-family waste audits, having a smaller volume reference point is advisable. Additionally, volume measurements are difficult to gauge without compacting the items. Large plastic containers, which are mostly air space, for example, were not compacted at all and therefore were recorded as having a very large volume. Dense aluminum foil, on the other hand, hardly counted in this volume measurement. The intern did break down cardboard boxes the best that he could. For future audits,

compacting items might be a way to better understand the real volume of the materials under study.

Particularly in the trash bin, sorting items proved to be fairly difficult. For example, Weintraub had a handful of experiences when food items were rotting, covered with maggots and stuck to plastics and other non-compostable items. The intern did his best to separate all of these items into the appropriate piles, but by no means was this process perfect. When items were particularly molded together, they were placed in the trash bin. Therefore, the true trash component of the experiment is slightly overestimated.

There were also items that Weintraub was unsure how to sort. This did not happen very often because he consulted with experts including Kimberly Lam at Republic Services and Steve Richard. However, in the rare times that he did not know the appropriate place for an item, the intern made his best guess as to where something belonged. Somewhat waxy cardboard trays, liquid soap dispensers and aerosol cans were among the items that at one point the intern had to guess where to put. In general, firm plastics and (unsoiled) metals were put in the recycling, while any paper products with food were put in the compost.

The approach for the green bin was not as thorough as the other two bins. However, it expedited the process tremendously, saving the intern a huge amount of time and energy. It seemed like too much wasted effort to spend lots of time sorting the green bin. It was soon apparent if families were composting effectively based on the contents of their blue garbage bins.

One other limitation of the approach to the green bin is that Weintraub did not ask all of the families if they compost independently. Asking if families composted independently would have enhanced the data.

Finally, this research is limited by only having 20 data points. Certain outliers have huge weight within the dataset. To get more accurate data, more of these audits are recommended. More audits are not completely necessary, however, because important patterns are clear from doing just the 20 houses.

RESULTS

Sustainable Lafayette audited 20 households ranging from 2 to 6 people, with a mean family size of 3.95. The average total weight within the recycling and trash bins was about 11.02 lbs per person per week. The average volume within the recycling and trash bins was a little over one basket per person per week (find data charts attached). The results of the waste audit of the recycling and trash bins are summarized in Figure 1.

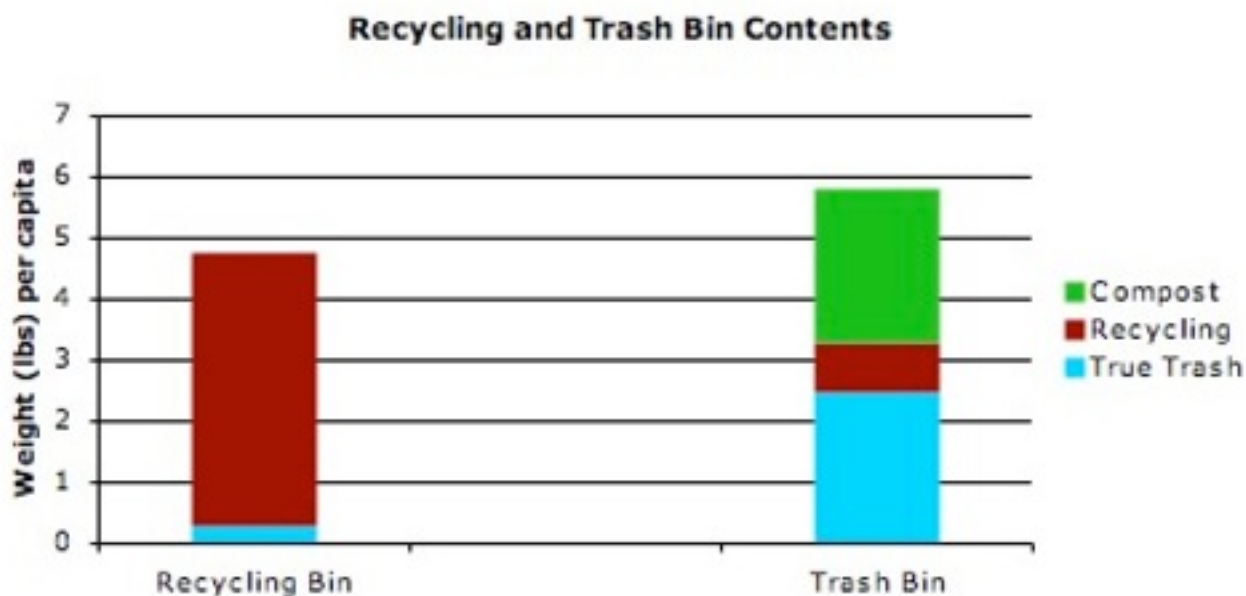


Figure 1 compares the contents of the recycling and trash bins by weight. Compost (green) made up 44% of the trash bin. Recycling (brown) made up 13% of the trash bin and 93% of the recycling bin. True trash (blue) made up about 43% of the blue trash bin and 7% of the recycling bin.

ANALYSIS OF RECYCLING BINS

The cumulative composition by weight of the recycling bins under study is shown in Figure 2. The contamination rate within the recycling bins was about 6.7 percent by weight and 11 percent by volume. The most prevalent contaminant in the recycling bin was soft plastics such as plastic bags and liners. Fourteen of the twenty houses under study had some sort of soft plastics in their recycling bin (see data charts attached). Plastic bags weigh next to nothing and take up a small amount of space, which is partially why the recycling contamination rate appears so low. The plastic bags around newspapers were very common in the recycling bin. These bags have a big recycle number 4 on them, confusing many residents. Items including Styrofoam, chip bags,

Recycling Bin Composition

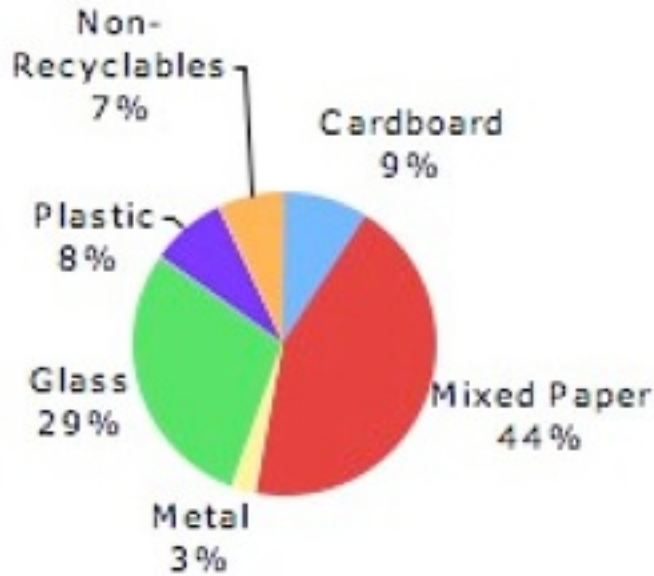


Figure 2 shows the percentage of cardboards (blue), mixed paper (red), metal (yellow), glass (green), recyclable plastics (purple), and non-recyclables (orange) as measured by weight and rounded to the nearest whole number.

used paper plates, paper napkins, paper towels, and cardboard food containers (including pizza boxes) were fairly prevalent contaminants of the recycling bins as well (see pictures 3, 4 and 5).

When assessing the recycling contamination data, it is important to note that one family had a 40 percent contamination rate (family H) and two others had above 20 percent contamination levels (families F and P). Subtracting off these three outliers, the contamination rate is 2.5 percent. Of the 20 homes in study, 5 had no contamination in their recycling bin at all.

Common Recycling Contaminants:



Picture 3: Dirtied Paper Cup (compostable).



Picture 4: Styrofoam, wrappers (trash).



Picture 5: Soft Plastics, paper towels (compostable), newspaper liners (green bags).

ANALYSIS OF TRASH BINS

57% of the material (by weight) found in the trash bins could have been recycled! 44% of the material was compostable and could have been put in the green bin and 13% of the material was recyclable and could have been put in the brown/burgundy bin. See Figure 3 and Figure 4 for the trash bin composition by weight and by volume.

While the overall “contamination rate” was 57%, the rate varied significantly across the 20 homes. The three houses that used food scrap recycling still had large amounts of food in their blue bins and surprisingly high garbage contamination rates - 32% (C) and 60+% (S and P). Two houses (I and J) stood out with the lowest contamination rates of about 10%. House I ate out most of the week and had very little garbage whatsoever. The owner of House J said that she composts independently.

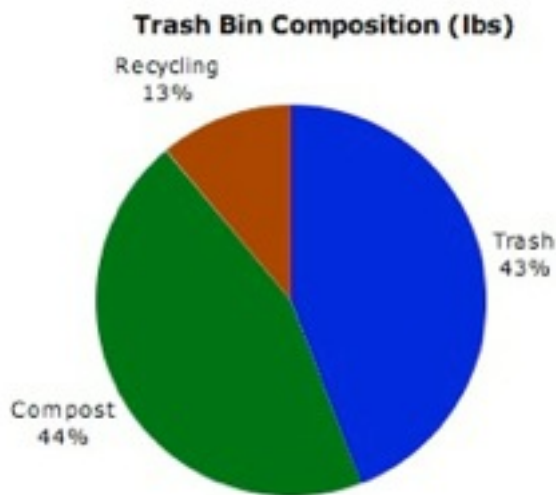


Figure 3 compares the relative weights (in lbs) of compostables (green), recyclables (brown) and actual trash (blue) found in the blue garbage bins in this study.

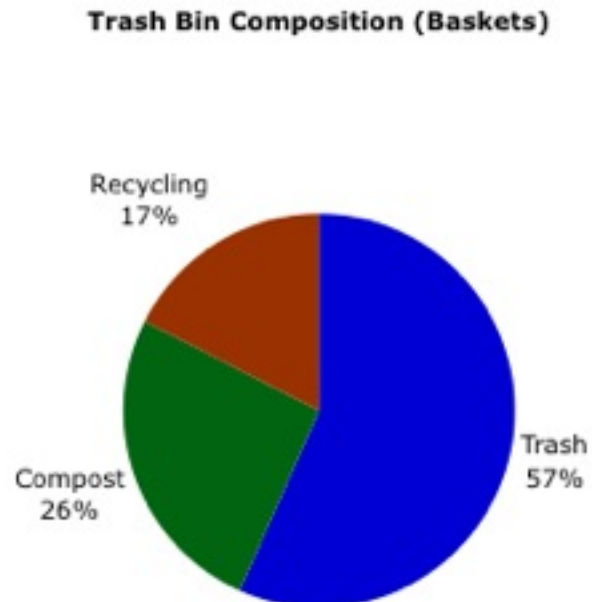


Figure 4 compares the relative volumes of compostables (green), recyclables (brown) and actual trash (blue) found in the blue garbage bins under study.

As mentioned earlier, the percentage of trash is an over estimation. When items were extremely difficult to sort, they were placed in the trash pile (see methods). Even still, compostable items outweighed actual trash items (Figure 3).

Common compostables in the trash:

Compostable items represented 44 percent of the blue bin by weight and 26 percent by volume (Figures 3 and 4). Compostable items found in the blue trash bin included actual food such as fruits, breads, cheeses and meats, food scraps such as cornhusks, banana peels and vegetable stems, as well as compostable paper products like paper towels and napkins. (Pictures 6 and 7).



Picture 6: Soiled papers and cardboard, cornhusks, banana peels and other food scraps.



Picture7: Breads, paper towels, fruit, etc.

Common recyclables in the trash:

Recyclables represented 13 percent of the blue bin contents by weight (Figure 3) and 17 percent by volume (Figure 4). Recyclable items found in the trash included everything: newspapers, metal cans, cardboard boxes, firm plastics and glass bottles. There was no one category that seemed overrepresented. Often, identical items were found in both a recycling bin and a garbage bin at the same house.



Picture 8 shows recyclable items recovered from a blue trash bin. Recovered recyclables tended to be a wide range of items from cans to paper to cardboard.

Hazardous waste in the trash:

20 percent of households (4/20) had hazardous waste in their blue bins (Figure 5). Household hazardous waste discovered included paint (House A), electronics (Houses C and E), batteries (Houses E and H) and light bulbs (House A).

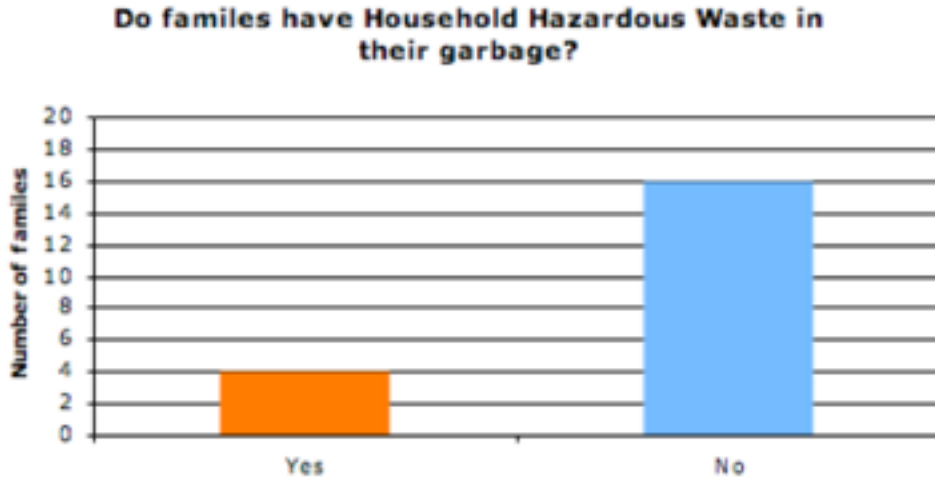


Figure 5 shows the number of families with Household Hazardous Waste (HHW) items in their garbage compared to the number of families who did not have any HHW.



Picture 9 shows hazardous waste materials recovered from a blue trash bin. Headphones, a cord and other electrical materials are pictured.

Properly placed in the trash:

Items that were properly put in the trash included soft plastics, Styrofoam and chip bags. There were also several more rare items found in the trash such as shoes, clothing, backpacks, and a stone slab all counted in the trash category. Together these items made up 43 percent of the blue bin by weight (Figure 3) and 57 percent by volume (Figure 4).

ANALYSIS OF GREEN BINS

Only three out of twenty families (15%) had food items in their green bins (Figure 6). These three families still all had food waste in their blue bins and overall did not have notably below average trash contamination rates (see data spread sheet). None of the families under study had non-food compostable items such as soiled paper or cardboard in their green bins.

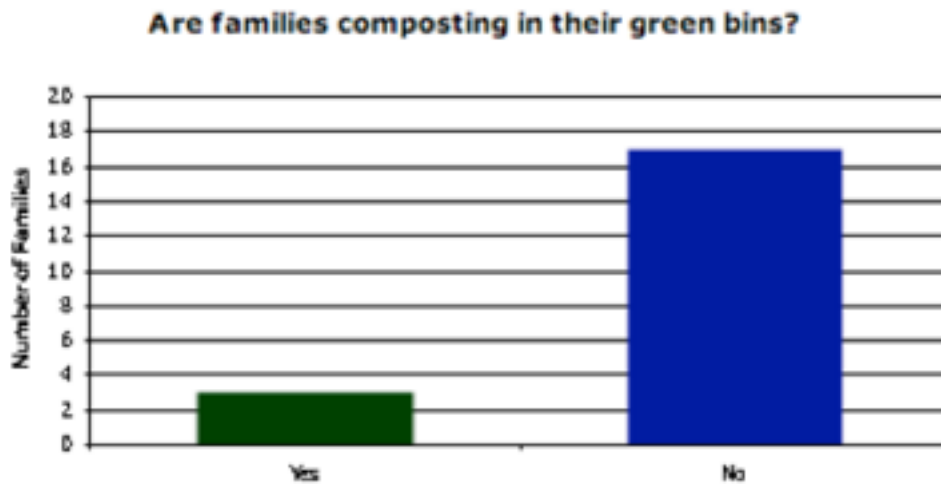


Figure 6 shows the number of families under study who used the food scrap recovery program (green) compared to the number of families under study who did not use the program (blue).



Picture 10 shows carrots in the green yard waste bin at one of the 3 houses that participated in the food scrap recovery program in this study.



Picture 11 shows one house that used a compostable “plastic” bag for food scraps in their green bin. These bags are discouraged.

DISCUSSION & RECOMMENDATIONS

There is definite confusion about where to put plastic bags (especially those labeled with the recycling symbol). Going forward, it is important to make sure that recycling labels are very clear about the new policies pertaining to plastic bags. More educational materials about grocery store plastic bag recycling should go out to residents. Since the newspaper liners were among the most prevalent plastic bags found in the recycling bin, Sustainable Lafayette may want to contact the local newspaper company to try to get the labeling more clear for those bags.

Many families misplaced soiled papers and cardboard in either the recycling or the garbage containers. Better labeling explaining to put these items in the green bin should be developed. Telling people that pizza boxes could go in the green bin seemed to be a tip that stuck with people. Promoting this idea of where to put soiled cardboard and plastic might be an effective strategy going forward.

Sustainable Lafayette had assumed that basic recycling education was less critical than education about food scrap recycling for improving Lafayette's diversion rate. This hypothesis proved to be true. But, the amount of recycles found in the blue waste bins was still surprisingly high. These included a wide array of items and didn't have a recurring theme. Often times things in a family's recycle bin also showed up in the garbage bin. One possible explanation for this may be that people know how to recycle basic items but have simple lapses in thought. Another explanation is that certain people in the house or workers on the property do not know the proper recycling protocol in Lafayette (suggestion from House R). While composting more effectively will have a relatively larger impact on waste diversion, the impact of sorting recyclables better is significant and should not be forgotten completely.

Having said that, improving composting rates should be the primary goal of all stakeholders attempting to improve waste diversion rates in Lafayette. Compostables outweighed trash in the land fill bin (Figure 3). Only three of the twenty households had food scraps in their green bins, and zero had compostable paper products (Figure 8). People tend to put compostable items in their blue bin rather than their green bins.

Why? While Sustainable Lafayette's research this summer did not really directly ask residents why they do not compost, several different explanations emerged through conversation. Many claimed that they did not know about the composting program. This seems like something that is pretty easy to fix through better labeling of bins and increased educational outreach. There were also those, however, who knew about the composting program but were still not composting. Some pointed to not having an in-kitchen compost bucket, or a fear of the smell or dirt. Getting a container is free through the waste authority or by reusing/repurposing items that families already have. The dirt and smell issue should go away with a container of some kind. Others said that they simply "try their best". One woman even told Weintraub that she just gets

lazy. The truth is that if people really wanted to compost, it is easy enough to do so. Changing people's behavior, however, is very difficult.

Finding creative ways to get people to compost should be a goal of Sustainable Lafayette's going forward. A zero waste challenge of some kind may be a worthy project that could utilize video and social media. It is hard to know exactly the right approach but doing something creative and generating conversations could end up translating into action.

In regards to this summer's waste audit project, the only way to know if conducting these audits positively influenced the behaviors of the 20 families under study would be to go back and do follow up audits. Weintraub recommends that he conducts audits on the same 20 households in six months to document the changes that occur over time. This would allow Sustainable Lafayette and Republic Services to see whether this process was effective in positively changing the family's behaviors. If so, conducting more waste audits may be a beneficial strategy going forward.

REFERENCE

RECRUITMENT LETTER

Hello!

I'm interning for Sustainable Lafayette this summer. As you may have heard the City of Lafayette is working towards a 75% waste diversion rate, which means that we want 3/4ths of our waste stream going into those recycling and compost bins (you can learn more at recycle-lafayette.org). In order to better understand the opportunities for increased recycling, Republic Services has asked Sustainable Lafayette to conduct "waste audits" on about 20 homes in Lafayette this summer. The goal is to learn more about what Lafayette residents currently throw away that could be either recycled in some way or eliminated from the waste stream all together. We were wondering if you'd be willing to allow us to stop by one evening during the summer to measure and inspect the contents of your bins.

The information that we collect will be left completely anonymous. Nothing will be published with your name or house information on it. All data will be aggregated and given to Republic Services, who will soon become Lafayette's garbage and recycling hauler.

The only thing you'd need to do is give us permission to come by on a specific evening before your regularly scheduled garbage pick up. I would then conduct the "audit" outside your home. Don't worry I'll bring lots of tarps and won't leave any garbage lying around. We can talk afterwards about what I found and some ways of reducing your garbage (but we don't have to if you're busy or grossed out or whatever). If that sounds OK to you, please email me back with your address, garbage pick up day and the number of people currently living in your home. I will then follow up with you to find a date that works. If you have any friends or neighbors who you think may be willing to participate feel free to forward this message along.

Hope you're having a great summer so far and I look forward to hearing back from you soon.

Ben

925-212-3350

Sustainable Lafayette
www.sustainablelafayette.org

EXAMPLE FOLLOW-UP LETTER

Thanks for letting me stop by yesterday. It all went really well. Here's a summary of the findings.

You had 46.2 pounds in your recycling. Most of that (30.8 lbs) was from paper products. Glass was also a significant (10.2 pound) portion of that. 2.4 lbs in the recycling bin actually did not belong in that bin. This included some food items and some soft plastics. We're only able to recycle hard plastics currently in our curb side services. Unfortunately, you have to take your plastic bags to the front of Safeway if you want to recycle those. That may be changing in March though, so keep a look out for a mailer about that.

You had 17.9 lbs in your blue bin. 5.5 lbs of that could actually have been composted using your green bin. Compostable items include food scraps and soiled papers like paper towels or napkins. Very few people know that you can put non-yard waste in the green bin, which is one of the main reasons why I'm doing this project! I recovered 3.8 pounds of recyclable items from the trash as well.

Thanks again for supporting me with this project. Let me know if you have any questions.

Best,
Ben

PS checkout recyclelafayette.org for easy tips to reduce your landfill waste.