ESLP

Education for Sustainable Living Program

Green Labs Team

Final Report: Recycling Initiative

Spring 2015

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EXECUTIVE SUMMARY

Laboratories at academic institutions are often left with inadequate recycling resources in comparison to the rest of the campus. Unfortunately, recyclable lab materials are often discarded with simple waste, an action that can be attributed to the inaccessibility of recycling resources and the limited information for handling lab-specific products. In order to evaluate existing recycling practices in UCLA labs, we developed an approachable, comprehensive recycling initiative that emphasized accessibility and efficiency for all individuals involved in the recycling process. Through primary research and investigation, our team developed a case study that would measure the success of our proposed recycling initiative in two labs within the UCLA Biomedical Sciences Research Building, BSRB 354 and 357. There were a total of eight labs within the two spaces that agreed to participate in our program. By conducting preliminary waste audits, we gathered baseline data of lab waste management practices, which allowed us to discern which recyclable materials were being disposed of improperly. We proceeded with the implementation phase, in which we distributed recycling bins with lab-specific informational signage. After several weeks, we conducted the final waste audits to compare our results from before and after the implementation phase. Additionally, we distributed an electronic survey to gauge our initiative's success and to further understand the personal recycling practices of researchers and custodial staff. Our waste audits revealed an average decrease in the percentage of recyclable items in the trash bins by 8.4%. Of the recycled materials, 97.3% of the waste was properly sorted and disposed of. Therefore, our recycling program successfully diverted recyclable materials from the trash waste stream, which was also verified by the qualitative data provided in the survey responses. We predict that recycling rates will increase even more as

recycling habits shift after longer exposure to an environment with recycling bins. Given the positive results of our initiative, we recognize that recycling practices can be improved with proper resources and researcher participation. We suggest that our recycling initiative be applied on a larger scale to the rest of UCLA labs. We hope this project stimulates greater interest in lab sustainability by serving as a model for future research to improve laboratory recycling practices.

BACKGROUND

Labs use four to five times more energy than other spaces on campus, with the average fume hood using the same amount of energy as 3.5 households and emitting the same amount of CO_2 as a vehicle (UCLA Environment, Health, and Safety). UCLA's campus is comprised of 10% lab space, with over 1,400 fume hoods. Given these statistics, laboratories are the least environmentally friendly areas of the campus, so eco-friendly adjustments in other areas of the lab must be made to offset these necessary energy expenditures. Standard green practices include green chemistry, energy reduction, purchasing, equipment sharing, and waste disposal through best management policies for materials reuse and recycling.

UCLA's existing green lab practices are defined by standards set in the United States Green Buildings Council's performance rating system, Leadership in Energy and Environmental Design (LEED), which UC policy has enforced for Energy Star appliance purchasing, paper waste reduction, condensing of shipment orders, purchasing of environmentally friendly materials, and return programs to vendors. UCLA also has its own Laboratory Energy Efficiency Program (LEEP) through the Office of Environment, Health, and Safety to inform researchers of

sustainable practices without compromising research needs, which is achieved primarily through behavioral change with informational reminders posted on lab doors.

Beyond the UC system, there exists a broad expanse of "greening up" lab practices, considering that many other campuses have implemented eco-friendly lab policies. Such examples include Cornell, which has a chemical safety and energy use reduction program of changing computer settings, UCI, which has a Smart Labs Initiative through energy consumption in the Better Buildings Challenge, UCSB, which has a variety of programs that address waste, assessment, and surplus chemicals, and University of Texas, which has a nitrile glove and Styrofoam recycling program.

Within the Institute of Environment and Sustainability, only two years of ESLP Action Research Team work has been accomplished, both of which were at the initiation of the program. They focused their efforts on a simple plastic waste life-cycle assessment at the Dental School's Weintraub Center, in which they shadowed researchers, conducted interviews, and collected data on the waste. It is imperative that UCLA begins to address these issues in an updated, efficient model, given the waste stream and environmental concern that laboratories exhibit.

OBJECTIVES

After investigation and preliminary research, our group concluded that recycling practices in UCLA laboratories could be improved tremendously. Our main objective was to develop and create a lab recycling initiative that had the potential for longevity and further research.

Throughout the past two quarters, we developed flexibility in redefining the objectives of our project. We sought out to test the effectiveness of our program by implementing it in several labs at UCLA. We initially planned to conduct waste audits in different types of labs, but we decided to maintain consistency by selecting labs from the same building and room layout to eliminate variables and keep our data reliable. We chose the Biomedical Sciences Research Building (BSRB) based on the established contacts that our stakeholder, BSRB lab manager Klara Olofsdotter-Otis, has with various labs in the building. We hoped data analysis from the preliminary waste audits would provide us with enough familiarity of the different categories of lab-generated waste in order to implement the most efficient recycling program for the participating labs.

As we spoke and interacted with more with staff, students, and researchers, we began to better understand the obstacles they face to properly recycle. Recycling can be disruptive to their workflow and is not always convenient. In addition to our original goal of developing an effective program, we also wanted to develop a program that was feasible and efficient for all who are involved. Recycling requires effort on behalf of students, staff, and researchers in labs so we wanted to make our new program as simple as possible for them. In order to achieve this, we maintained continuous contact with our participants so they knew we were available to answer questions and also so they remained aware of our project timeline. To make the recycling process accessible for staff, students, and researchers, but also convenient for the custodians who pick up the recycling, we placed our bins and signage outside of each lab door. We originally wanted to give our participants to use the recycling bins for at least 2-3 weeks before doing our final waste audits to measure the effectiveness of our program. However, we had to overcome a

few unforeseen communication obstacles before our bins were delivered, so the labs only used the bins for a week and a half before we conducted our final waste audits.

We predict that laboratory recycling efforts would have increased even more if the labs were given more time to adjust to the new program. We succeeded in educating laboratory staff, researchers, and students on better waste management practices through the implementation of our signage and their participation in our program. Overall, we achieved our goal of promoting awareness for increased laboratory sustainability at UCLA. We want to extend the need for promoting better waste management practices beyond UCLA's campus. Our hope is that our project can serve as a model for further research at other academic institutions.

RESEARCH METHODOLOGY

Literature Review and Preliminary Research

At the beginning of the project, the team spent several weeks on meetings in which we reviewed existing literature and relevant policies. Given that the purpose of the ESLP Action Research Team program focuses on improving sustainable practices at the UCLA campus, the team further researched UCLA's existing green lab practices by exploring a recycling program specific to the School of Dentistry's Weintraub Center as well as campus-wide recycling practices. By following up with the Weintraub Center lab director, Dr. Ichiro Nishimura, who also was a stakeholder for the 2008 Sustainable Lab Practices Team, we found that sustainable practices were well integrated into the lab center through energy-efficient technologies and recycling resources. However, no institutional memory for the recycling program remained, since the incoming researchers did not inherit the knowledge of the previous generation of

researchers. Therefore, we were intent on designing a program that addresses this issue of longevity. In order to understand the campus-wide recycling practices, we reached out to the UCLA Recycling Coordinator, Jesse Escobar, who gave us a tour of the recycling facilities on campus and made us aware of our available resources, which included free recycling bins.

Project Design

After conducting a considerable amount of literature research on the topic of sustainable lab practices, the team came up with two possible project directions to pursue, namely a project on energy conservation and a project on recycling. We spent two weeks to discuss the details of each project. Given all considered factors, the team made a group decision to pursue a recycling project and encourage the possibility of an energy conservation project for future years' Green Labs Action Research Teams.

Through our recycling initiative, we intended to expand upon the previous ART team's results with Weintraub Center in order to further develop recycling programs specific to lab settings. With advice from our stakeholder Klara Olofsdotter-Otis, the team decided to conduct a quasi-experiment, with waste audits conducted before and after the implementation of our lab-specific recycling programs. In terms of timeline, we intended to finish the initial round of waste audits before the end of the winter quarter. Thereafter, we planned to implement our recycling program throughout the spring quarter. Finally, we expected to conduct our final round of waste audits near the end of spring quarter.

Participating Laboratories

In order to create quantifiable metrics from our case study, we first needed to identify the range of labs that we were planning to examine. After lengthy discussions of different types of

labs on campus and different types of waste that are generated in these labs, we decided to narrow the scope of our project to simple waste in labs in the Biomedical Sciences Research Building for the following considerations. First, dry labs such as psychology labs in Franz Hall generate mostly paper waste that is largely recycled, so their recycling waste is largely accounted for. Second, wet labs are located in various buildings on campus, with different waste streams, building management procedures, and facility levels. Third, hazardous waste in wet labs is treated according to the standard lab practice required by the UCLA Office of Environment, Health, and Safety. Thus, only people who have attended special training are allowed to handle the hazardous waste. As a result, many confounding variables could impact the consistency and effectiveness of our recycling program. To minimize the influence of such variables, the team chose to use Biomedical Sciences Research Building as the study area, given that our stakeholder Klara Olofsdotter-Otis is a lab manager in this building. With her knowledge of the lab structure and her human resources in the building, we were able to reach out to more researchers and lab managers than anticipated.

Interviews with Lab Managers

After the team decided to proceed with the recycling project, our stakeholder Klara Olofsdotter-Otis sent an email to all the lab managers in the Biomedical Sciences Research Building to seek interested participants for the projects. Our response rate was relatively high, and we even received interest from outside the Biomedical Sciences Research Building due to word-of-mouth dissemination. By the end of winter quarter, we conducted preliminary interviews to understand existing waste practices with the interested lab managers. The interview addressed how the labs manage their waste streams, whether there were any existing recycling

practices, what hindrances exist for recycling, and how many long-term residents are in the labs, among other questions. These interviews helped inform the design of the recycling program within each lab.

Waste Auditing

Before conducting the waste audits, the team spent a significant amount of time reviewing literature online on how to conduct a waste audit, so that we were prepared as much as possible. In preparation, the team spent a week reviewing the proper procedures for a waste audit. The team compiled a data spreadsheet beforehand for data collection. Group members also participated in the online lab safety training to get qualified for working in the lab.

The baseline waste audits were conducted during winter quarter, and the final waste audits were conducted during spring quarter. Both audits took place in Room 357 and Room 354 in BSRB. Each room housed four labs, each of them taking three to four work benches inside the room. We wanted to reduce our time in the lab, so that the researchers were not disturbed. In regard to quantity and timing, we decided to assess a day's worth of trash. Given that waste was picked up daily by the custodians at 6:00 PM, we simply beat them to it by removing the trash and sorting it in the loading dock of the building that Jesse Escobar had shown us earlier. The waste audits were efficient in that we had one individual taking an inventory of each item in the trash, while the rest of the team sorted through the waste. Rather than weigh the trash, we decided to do a numerical count of the objects, to see which were recurring and which were recyclable. In doing so, our procedure was more time consuming, but also more rewarding in seeing the actual data and areas that we could focus on for our implementation component.

For the baseline waste audit, we randomly selected two tall bins from each lab and two tall bins from the common area, resulting in a total of ten trash bins to go through in audit. For Room 354, we decided to examine one more tall bin from the Plath lab's culture room due to high waste generation rate. For the final waste audit, we randomly selected one or two bins from each lab, depending on the total volume of trash collected from the bins. In this way, we kept the amount of trash roughly constant across the eight labs. Also, we randomly selected two recycling bins out of the three recycling bins we implemented for examination in the final waste audit to see how much materials are properly recycled. The results of those waste audits for the eight labs can be seen below in the Appendix. Additionally, in order to relay what items are considered recyclable for those specific labs, we used the data from our preliminary waste audits to create informational signage for our recycling bins, which can be seen in the Appendix as well.

Recycling Program Implementation

After the initial waste audit, the team was ready to implement recycling bins to encourage recycling practices in the Biomedical Science Research Building. Originally, the team wanted to place the recycling bins inside the lab rooms so that lab members had convenient access to the bins to recycle more often. However, the janitors who collect the recycling bins once a week do not have access to the lab rooms. As a result, it was more feasible to place the bins outside the lab space. With the UCLA Recycling Coordinator Jesse Escobar's help, we ordered and placed three recycling bins outside each door of room 357 and room 354. For those labs outside of BSRB that were not participating in the "experiment" component of our study, we still delivered the recycling bins and the signage, so that they'd have access to those resources. After the bins were in position, we sent out surveys to the lab members asking about their recycling experience.

We also collected surveys from the janiors to gauge their opinions on recycling practices on campus. The survey questions and answers can be seen below in the Appendix.

Cardboard Box Study

As a side project, our stakeholder Klara Olofsdotter-Otis indicated that many cardboard boxes are placed outside the lab doors everyday for pick-up by the janitors. An interesting questions was raised: If cardboard boxes do not fit inside the recycling bins, are they still recycled? The team decided to research the question in the time span of a week, given the limited time frame of this mini-project. Each team member was assigned a day in the week to check the status of the cardboard boxes in the hallway before janiors arrive. The detailed record of the cardboard box study can be seen below in the Appendix.

RESULTS

The preliminary and final waste audits we performed allow us to quantitatively interpret the outcome of our research project. For both waste audits, the relative number of items in each laboratory's trash bins remained the same. As shown in Table 1 and Table 3, the Payne laboratory had the most amount of trash in BSRB 354. Similarly, the Kurdistani Laboratory has the most amount of trash in BSRB 357. This remained constant during the preliminary and final waste audits, indicating that our recycling program did not affect the relative amount of items being thrown away but rather focuses on diverting recyclable waste into the provided recycling bins.

In our two study areas, BSRB 354 and BSRB 357, the amount of recyclables located in the trash bins decreased during our study. A comparison of the preliminary and final waste audits

of BSRB 354 reveal a decrease in the percentage of recyclable items in the trash bins by 6.8% as shown in the Comparison Visualizations. Similarly, a comparison of the waste audits of BSRB 357 revealed a decrease in the percentage of recyclable items in the trash bins by 10.7%. Therefore, the data illustrates that our recycling program diverted recyclable materials from the trash waste stream.

During the final waste audit, we examined the six recycling bins placed outside three doors of BSRB 354 and three doors of BSRB 357. The recycling bins outside of BSRB 354 collected 43 more items than the bins outside of BSRB 357. Also, 50% of the items in the recycling bins outside of BSRB 354 were lab-related, while only 24.3% of the items in the recycling bins outside of BSRB 357 were lab-related. Two rubber gloves were found in the recycling bins outside of BSRB 357, which are non-recyclable due to possible contamination. However, all of the items found in BSRB 354's recycling bins were recyclable.

Qualitatively, the survey provided for researchers within our study laboratories revealed an increase of knowledge regarding recycling and behavioral changes. The survey responses show that the researchers recycled more after we implemented the recycling bin program and that the informational signage was helpful. The increased recycling data from our quantitative study results coincide with the survey responses.

For the cardboard box study, we noticed that 20 cardboard boxes of varying sizes were left outside of the study area for the five-day time span. Given the different sizes, it appeared that the boxes were picked up consistently by the janitors.

DISCUSSION

As indicated in the charts in the Appendix below, our data results suggest that our recycling initiative was successful in implementing a simple, voluntary system for researchers to properly dispose of their recyclables. By following through the entire chain of recycling from source to sink, we were able to help researchers gain access to recycling bins, better understand which materials are considered recyclable, and get them in contact with the recycling staff on campus. The data supports this, since recycling increased substantially within only a two week period. Additionally, items that were recycled were clean, defaced, and handled in the proper manner.

In regard to the survey data, responses indicated that researchers and custodians have varying levels of knowledge and interest regarding recycling. The most significant finding is that researchers unanimously agree that informational signage is the best resource to encourage recycling in the lab. However, one custodian who responded was surprisingly interested in the implementation of better education programs for students and staff. Further research into how to better integrate recycling into UCLA culture would be critical to encouraging behavioral change in the laboratory and custodial communities.

The cardboard box mini-study suggests that cardboard boxes are a considerable part of the waste stream of labs that unfortunately went unaccounted for in our audits for simple waste. Since labs are constantly receiving new equipment and supplies, the shipping and packaging materials are substantial enough to create a daily waste stream. We suggest that future efforts to improve lab recycling delve further into reducing this source.

RECOMMENDATIONS

If there were to be a future ART team that attempts to implement a recycling program in the labs at UCLA there are several recommendation our team would make. First, we would suggest that the new team check up on the recycling program we implemented to ensure that it is still functioning both effectively and efficiently. The team before us implemented a recycling program in the Weintraub Lab. The director of that program was happy with the recycling program, but he felt that there was no institutional memory -- that once students graduated, there was nothing that educated the newer students about the recycling program. This resulted in the newer students being unsure as to what could or could not be recycled, essentially reducing the overall effectiveness of the recycling bins. Our group took measures to prevent the same thing from happening in our project by placing signage onto all of our bins. The idea behind this was that signage would prevent the loss of institutional memory by providing clear information as to what materials in the labs could be disposed of in the recycling bins. We hope this proves effective, but in the case that it does not work it would be ideal for the next group to check up on our recycling program. This would allow the new team to identify problems our team could not foresee and in the process avoid our mistakes.

Sadly, our stakeholder Klara Olofsdotter-Otis is moving away and will not be able to follow up on our project, but if that were not the case we would recommend that she check up on the bins to ensure that signage did not fall off. This could happen after months of use and could result in improper recycling practices. This is especially true if the bins stay in the building for years and there is a lack of institutional memory. The signage placed on the bins is currently the only resource informing people what can be or cannot be recycled; without them, we believe the

recycling bins would be far less effective. Therefore, it is paramount that signs be replaced if any signs are misplaced or damaged.

The next recommendation we would make for a future team hoping to implement a recycling program is that they focus on implementing a recycling program in only one type of lab. At the beginning of our project our team wasted time thinking we could initiate recycling programs in several types of labs, but what we soon realized was that it was not feasible. This is because different labs, such as biology, engineering, or psychology, create different the types of waste. Due to this variation in the waste created in different labs it would require different signage and more waste audits which we believed would result in a recycling project that was more time consuming and not likely to be completed within the 20-week period.

Our team would also suggest that the labs chosen for the recycling program be close in proximity. Our team implemented our recycling program in biomedical labs but specifically in the Biomedical Science Research Building. This allowed easy access the various labs and created a scenario where we could more easily coordinate the pickup of the new recycling bins by the janitorial staff. If we had to coordinate with various janitorial staff from different buildings it would have taken considerable amount of more time likely preventing us from focusing on the more important aspects of our project.

We would also recommend that the new Green Labs group conduct their waste audits early on in the project so that they can set up their bins far earlier. This will provide the team with a greater period of time in which their bins can be used. This will allow the team to determine the bins effectiveness and make changes based on feedback and observations. Our

team was not able to get our bins into the labs until halfway through the second quarter, which prevented us from making these time consuming observation-based improvements.

Another recommendation that we suggest regarding recycling in labs is how to measure the waste when doing a waste audit. Weighing waste is the ideal way to calculate the amount of recyclable waste being thrown into the garbage, but it might not always be feasible to get a scale, especially if you are collecting waste in a secured lab as we did. To get around this hurdle, we measured our recyclable waste as a percentage of the total waste being thrown out instead of using actual weight. This may prove an effective strategy for any team caught in the same predicament as our own.

In the case the upcoming Green Labs team does not decide to do general recycling in the labs, there are a variety of other projects they could attempt to focus on. Our team pondered initiating programs such as saving energy in the labs, investigating purchasing practices, and helping with the existing chemical surplus program. For energy use in particular, some ideas on how to reduce energy consumption in labs include conducting energy audits, categorizing lab equipment by energy use, creating special labels for equipment to save electricity, motivating researchers to engage in energy reduction practices, and “cooling up” freezers. All of these suggestions are viable projects that we not only recommend a future team to take up, but we believe would greatly benefit labs at UCLA. For any lab sustainability project, we suggest that the ART team creates a competition between labs to encourage researcher interaction and provide incentives for participation.

CONCLUSION

Our project was significant because we created and implemented a laboratory recycling initiative that proved effective in increasing recycling efforts. Throughout the process of our project, we developed flexibility in reshaping and redefining the objectives of our project. Our goal to reduce the amount of recyclables in simple waste proved to be successful. Additionally, gathering individual opinions helped us create a more effective and convenient recycling program. We predict that in the long-term, our program will prove to be even more successful as researchers become more familiar with recycling practices. There still exists a lot of obstacles to overcome in order to attain the best lab recycling practices. Communication and continual interactions with staff, researchers, custodians, and others involved is vital for the future success of recycling in labs. We hope our project generates awareness and desire for a greater need for sustainability in academic laboratories. This project can be the first step in the pathway for all labs at UCLA to have recycling bins, by supplying the necessary educational materials to ensure accessible, feasible, and efficient recycling practices. Overall, we hope our project can act as a model for other universities and UCLA Action Research Teams to promote laboratory recycling.

REFERENCES

"LEEP Program Overview." UCLA: Environment, Health, & Safety. Online. *University of California, Los Angeles.* Accessed on 12 March 2015.

ACKNOWLEDGEMENTS

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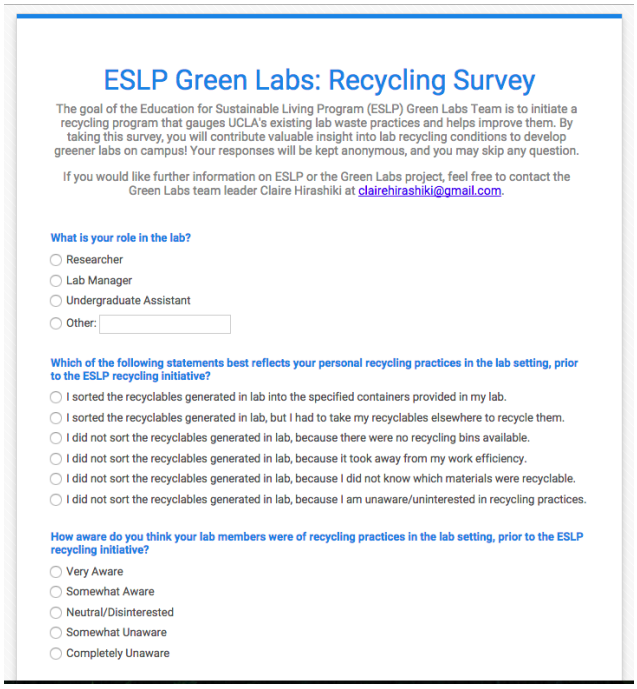
APPENDICES

I. Waste Audit Guide

1. Safety
    a. Gloves/PPE
    b. Lab Safety Training
2. Confidentially Measures
    a. Personal Information
    b. Personnel unaware of waste audit unless necessary (by unaware, do you mean that they don't know beforehand so that they are not doing anything differently than normal? when you come to the lab you should probably introduce yourselves to people you meet, say that you have permission from the PI/postdoc/lab manager and what you will be doing, say that you will do the waste audit in a corner where no one will be disturbed (I suggest doing the audits between 5-6 and ask if they have questions.)
3. Analysis of Waste
    a. Record in datasheet
    b. Teams of three individuals
        i. One person digs through trash and sorts into categories
        ii. One person takes pictures of items/categories
        iii. One person records type and number of items on datasheet
    c. Datasheet based on item type and material
        i. Be as specific as possible - description, photos
        ii. Measurement (% of total waste)
            1. Number of pieces found
4. Data Validity
    a. Correct sample size
    b. Measurement (% of total waste)
    c. Identify possible problems
5. Data Analysis
    a. Interpret data sheet
    b. Create recycling program based on waste data
6. Implementation
    a. Recycling and education program
7. Re-audit
8. Data Analysis after Implementation
9. Conclusions/Report

II. Lab Researcher Survey



ESLP Green Labs: Recycling Survey

The goal of the Education for Sustainable Living Program (ESLP) Green Labs Team is to initiate a recycling program that gauges UCLA's existing lab waste practices and helps improve them. By taking this survey, you will contribute valuable insight into lab recycling conditions to develop greener labs on campus! Your responses will be kept anonymous, and you may skip any question.

If you would like further information on ESLP or the Green Labs project, feel free to contact the Green Labs team leader Claire Hirashiki at clairehirashiki@gmail.com.

What is your role in the lab?

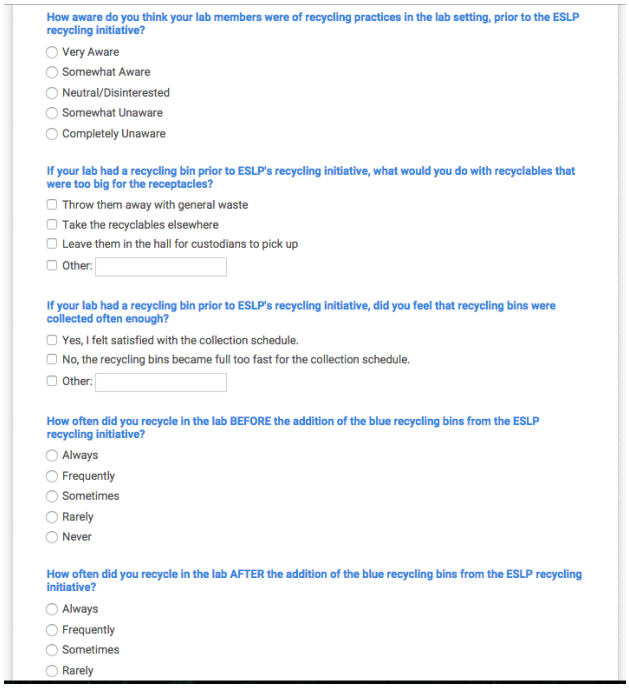
- ○ Researcher
- ○ Lab Manager
- ○ Undergraduate Assistant
- ○ Other:

Which of the following statements best reflects your personal recycling practices in the lab setting, prior to the ESLP recycling initiative?

- ○ I sorted the recyclables generated in lab into the specified containers provided in my lab.
- ○ I sorted the recyclables generated in lab, but I had to take my recyclables elsewhere to recycle them.
- ○ I did not sort the recyclables generated in lab, because there were no recycling bins available.
- ○ I did not sort the recyclables generated in lab, because it took away from my work efficiency.
- ○ I did not sort the recyclables generated in lab, because I did not know which materials were recyclable.
- ○ I did not sort the recyclables generated in lab, because I am unaware/uninterested in recycling practices.

How aware do you think your lab members were of recycling practices in the lab setting, prior to the ESLP recycling initiative?

- ○ Very Aware
- ○ Somewhat Aware
- ○ Neutral/Disinterested
- ○ Somewhat Unaware
- ○ Completely Unaware



How aware do you think your lab members were of recycling practices in the lab setting, prior to the ESLP recycling initiative?

- ○ Very Aware
- ○ Somewhat Aware
- ○ Neutral/Disinterested
- ○ Somewhat Unaware
- ○ Completely Unaware

If your lab had a recycling bin prior to ESLP's recycling initiative, what would you do with recyclables that were too big for the receptacles?

- ☐ Throw them away with general waste
- ☐ Take the recyclables elsewhere
- ☐ Leave them in the hall for custodians to pick up
- ☐ Other:

If your lab had a recycling bin prior to ESLP's recycling initiative, did you feel that recycling bins were collected often enough?

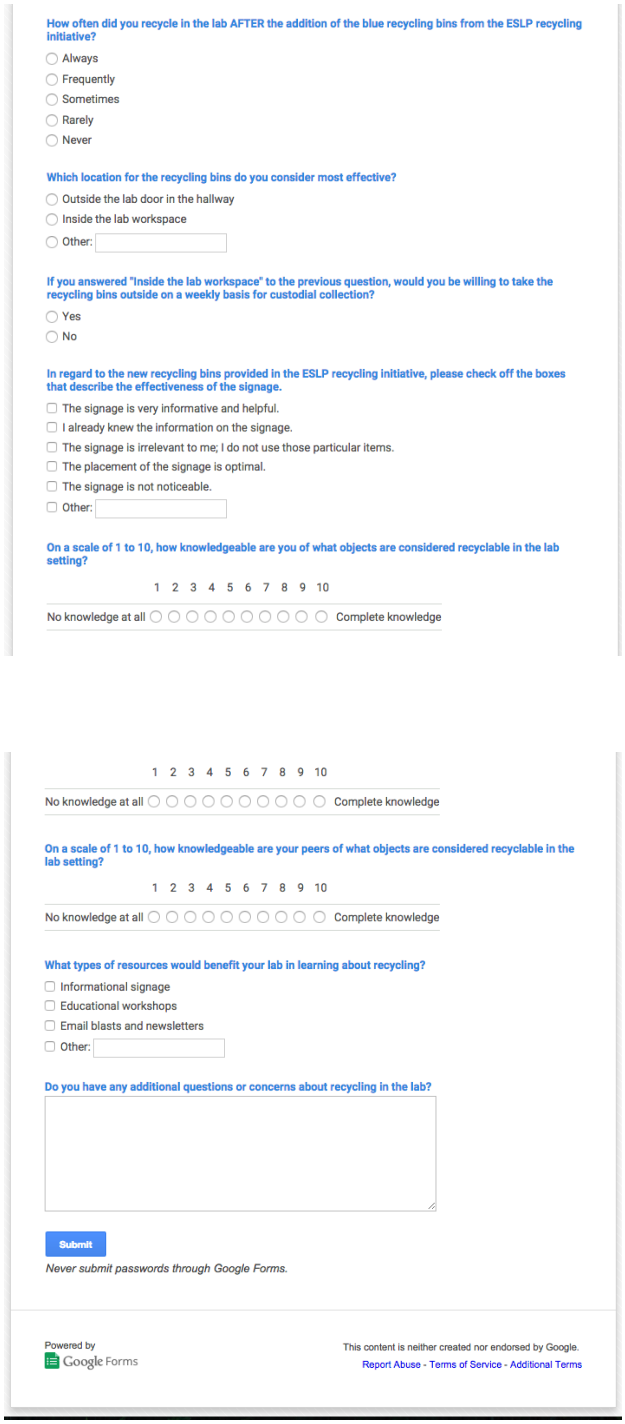
- ☐ Yes, I felt satisfied with the collection schedule.
- ☐ No, the recycling bins became full too fast for the collection schedule.
- ☐ Other:

How often did you recycle in the lab BEFORE the addition of the blue recycling bins from the ESLP recycling initiative?

- ○ Always
- ○ Frequently
- ○ Sometimes
- ○ Rarely
- ○ Never

How often did you recycle in the lab AFTER the addition of the blue recycling bins from the ESLP recycling initiative?

- ○ Always
- ○ Frequently
- ○ Sometimes
- ○ Rarely



How often did you recycle in the lab AFTER the addition of the blue recycling bins from the ESLP recycling initiative?

- ○ Always
- ○ Frequently
- ○ Sometimes
- ○ Rarely
- ○ Never

Which location for the recycling bins do you consider most effective?

- ○ Outside the lab door in the hallway
- ○ Inside the lab workspace
- ○ Other:

If you answered "Inside the lab workspace" to the previous question, would you be willing to take the recycling bins outside on a weekly basis for custodial collection?

- ○ Yes
- ○ No

In regard to the new recycling bins provided in the ESLP recycling initiative, please check off the boxes that describe the effectiveness of the signage.

- ☐ The signage is very informative and helpful.
- ☐ I already knew the information on the signage.
- ☐ The signage is irrelevant to me; I do not use those particular items.
- ☐ The placement of the signage is optimal.
- ☐ The signage is not noticeable.
- ☐ Other:

On a scale of 1 to 10, how knowledgeable are you of what objects are considered recyclable in the lab setting?

	1	2	3	4	5	6	7	8	9	10	
No knowledge at all	○	○	○	○	○	○	○	○	○	○	Complete knowledge

	1	2	3	4	5	6	7	8	9	10	
No knowledge at all	○	○	○	○	○	○	○	○	○	○	Complete knowledge

On a scale of 1 to 10, how knowledgeable are your peers of what objects are considered recyclable in the lab setting?

	1	2	3	4	5	6	7	8	9	10	
No knowledge at all	○	○	○	○	○	○	○	○	○	○	Complete knowledge

What types of resources would benefit your lab in learning about recycling?

- ☐ Informational signage
- ☐ Educational workshops
- ☐ Email blasts and newsletters
- ☐ Other:

Do you have any additional questions or concerns about recycling in the lab?

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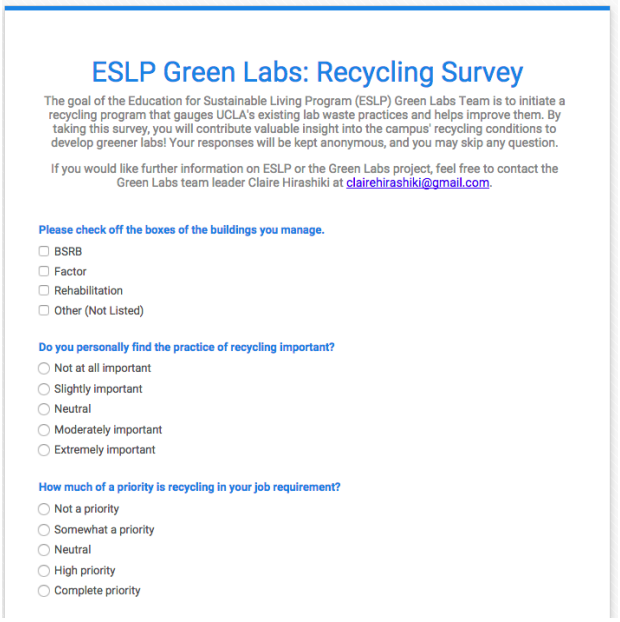
III. Custodial Staff Survey



ESLP Green Labs: Recycling Survey

The goal of the Education for Sustainable Living Program (ESLP) Green Labs Team is to initiate a recycling program that gauges UCLA's existing lab waste practices and helps improve them. By taking this survey, you will contribute valuable insight into the campus' recycling conditions to develop greener labs! Your responses will be kept anonymous, and you may skip any question.

If you would like further information on ESLP or the Green Labs project, feel free to contact the Green Labs team leader Claire Hirashiki at clairehirashiki@gmail.com.

Please check off the boxes of the buildings you manage.

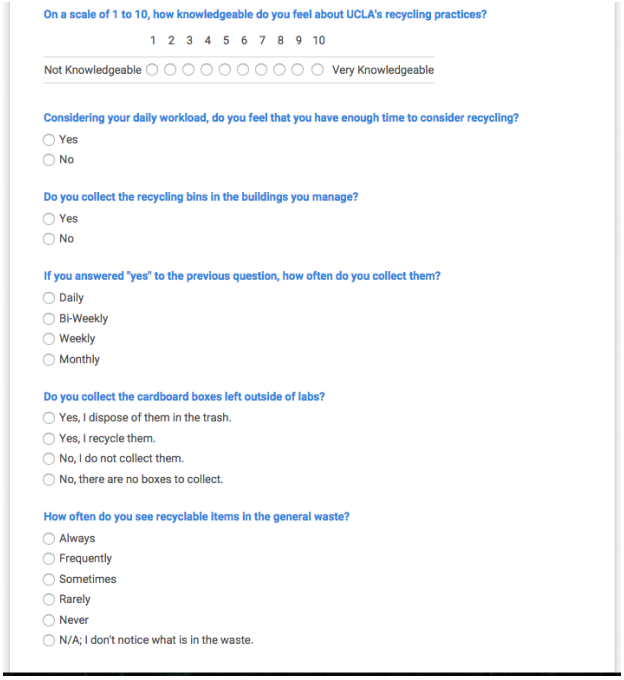
- ☐ BSRB
- ☐ Factor
- ☐ Rehabilitation
- ☐ Other (Not Listed)

Do you personally find the practice of recycling important?

- ○ Not at all important
- ○ Slightly important
- ○ Neutral
- ○ Moderately important
- ○ Extremely important

How much of a priority is recycling in your job requirement?

- ○ Not a priority
- ○ Somewhat a priority
- ○ Neutral
- ○ High priority
- ○ Complete priority



On a scale of 1 to 10, how knowledgeable do you feel about UCLA's recycling practices?

1 2 3 4 5 6 7 8 9 10

Not Knowledgeable ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ Very Knowledgeable

Considering your daily workload, do you feel that you have enough time to consider recycling?

- ○ Yes
- ○ No

Do you collect the recycling bins in the buildings you manage?

- ○ Yes
- ○ No

If you answered "yes" to the previous question, how often do you collect them?

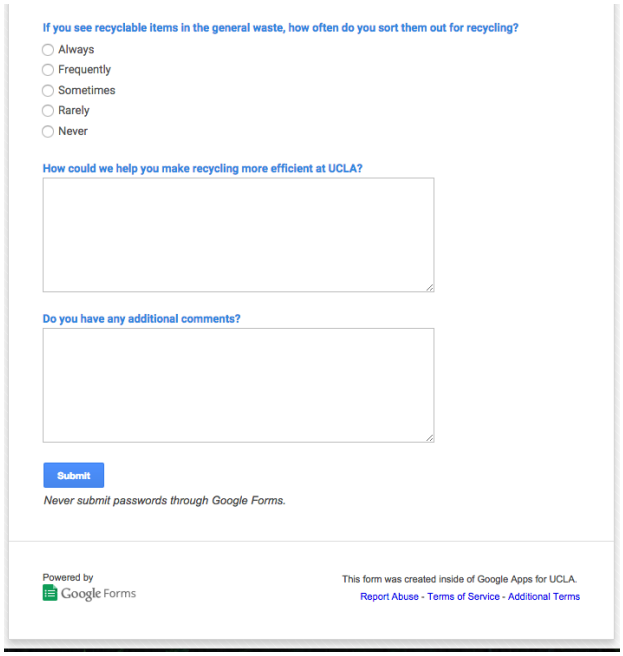
- ○ Daily
- ○ Bi-Weekly
- ○ Weekly
- ○ Monthly

Do you collect the cardboard boxes left outside of labs?

- ○ Yes, I dispose of them in the trash.
- ○ Yes, I recycle them.
- ○ No, I do not collect them.
- ○ No, there are no boxes to collect.

How often do you see recyclable items in the general waste?

- ○ Always
- ○ Frequently
- ○ Sometimes
- ○ Rarely
- ○ Never
- ○ N/A; I don't notice what is in the waste.



If you see recyclable items in the general waste, how often do you sort them out for recycling?

- Always
- Frequently
- Sometimes
- Rarely
- Never

How could we help you make recycling more efficient at UCLA?

Do you have any additional comments?

Submit

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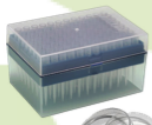
IV. Recycling Signage

CAN I RECYCLE THIS ?

WHAT GOES IN THE BLUE BIN?



- Pipette tip boxes
- Cell culture plates
- Petri dishes
- Defaced bottles
- Defaced chemical containers
- Aluminium foil
- Styrofoam
- Plastic wrapping
- Cardboard
- Paper
- Plastic bags

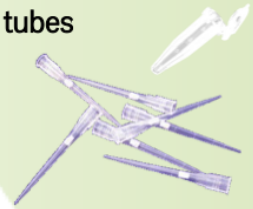
Remember! Recyclables have to be clean, dry, and free of toxic, biohazardous, and radioactive contaminants. Please deface chemical containers and media bottles before recycling.

WHAT ABOUT THESE ITEMS?

- **Borosilicate glass** → Broken Glass Disposable Container
- **Surplus chemicals** → Bring them to the next chemical waste pick-up for your building. Do not place hazardous waste tags on surplus chemicals you are donating.
- **Printer cartridges** → Mail to UCLA Recycling and Waste Management (Campus Maintenance c/o Recycling Coordinator, mail code 151308)
- **CDs & DVDs** → Collected by UCLA Software Central (locations provided at https://kb.ucla.edu/articles/where-can-we-recycle-cd-andor-dvd-on-campus)
- **Furniture, lab equipment, and E-waste (batteries, electronics, computers, cell phones)** → Contact your building manager or recycling coordinator Jesse Escobar at jescobar@facnet.ucla.edu

WHAT IS NOT RECYCLABLE?

- Pipettes
- Pipette tips
- Microcentrifuge tubes
- Conical tubes
- Gloves
- Syringes
- Needles



To get your own blue bin, please email recycling coordinator Jesse Escobar at jescobar@facnet.ucla.edu

V. Waste Audit Data (Preliminary) - 2/24/15

Item	Common Area	Carey	Wohlschlegel	Johnson	Kurdistani
plastic jar	1				
2ml plastic tubes	21	3	56	25	63
plastic bags	4		2		
cardboard box	4	1	2		2
pipette tips	447	31	165	139	396
rubber gloves	27	16	41	25	14
Paper pieces (clean)	169	16	49	25	61
Paper pieces (dirty)	33			10	
Disposable pipetting tube	1	1			
Tin Foil pieces	3	5	2	3	
Plastic trays	5				
Fat plastic tubes	3		7	3	1
Post it note	1				
Plastic pipette tip bag wrapper	1				
Sharpie marker	1				
Small purple tubes	10			7	
normal white paper	2				
pipette tip box		2			
Plastic pieces		6			1
parafilm pieces		5	1		9
plastic caps		4			
Envelope		1			
purple tube		1			
skinny tube		1	8	9	1
plastic wrapper			1		
weing tray			1		
plastic pipettes			24		7
plastic paper covers			2		
plastic pipette wrapper			21		8
chem wipe			22	25	15
sticky note			4		1
plastic tube rack				1	
paper towel roll				3	
small filter tubes				18	3
plastic for gel				2	3
piece of tape				1	
petri dishes					6
toothpicks					46
plastic filtration flask top					1
plastic culture tray					1
plastic microliter measurer					1

type 6 plastic					1
plastic elbow					2
plastic tray rows					9
Pipette Tip Packaging (plastic)					2

VI. Waste Audit Data (Preliminary) - 3/6/15

Item	Common Area	Weinmaster	Martin	Payne	Plath
2ml plastic tubes	3	2	18	94	8
plastic bags	3	1			9
cardboard box	5	2		1	1
pipette tips	99	39	153	321	32
rubber gloves	32	48	89	14	60
Paper pieces (clean)	16	23	13	102	33
Paper pieces (dirty)	1	2			
Tin Foil pieces		1			3
Fat plastic tubes		1	10	14	6
Plastic pipette tip bag wrapper		2			
pipette tip box	1	1	1	1	2
Plastic pieces	2	17	13	4	6
parafilm pieces			11	10	1
skinny tube		1	5	3	7
plastic wrapper			1		
plastic pipettes		2	8		16
plastic pipette wrapper			5		36
chem wipe	2	34	19	18	
filter tubes	1		2	4	
piece of tape	3				
petri dishes					2
toothpicks	4				4
plastic orange top filtration flas	1				
plastic tray rows			8		1
18/24 absorbant sheet	1			1	1
weighing tray		7			
classic plastic tube			2		
1ml tube			7		3
face mask			1		
water bottle cap			2		
thermosafe polar packs			3		
plastic culture box			11		
green tape				3	
syringe				4	
absorbant pack				1	
rectangular tips				19	
filter sheet				16	
millipore filtration					1
styrofoam					2
filtration flask					1
pastic scopper					1

RNA plastic envolopes					1

VII. Waste Audit Data (Final) - 5/19/15

Item	Carey	Wohlschlegel	Johnson	Kurdistani	Weinmaster	Martin	Payne	Plath
2ml plastic tubes	38	12	14	78	8	14	99	4
plastic bags		2	1	6		4	1	
cardboard box		2		1	1			1
pipette tips	76	94	67	264	71	43	153	28
rubber gloves	31	40	36	22	25	58	14	15
paper pieces (clean)			2		1		3	21
Paper pieces (dirty)	20	42	18	29	8	27	60	40
Tin Foil pieces	2					2		3
Plastic trays							1	2
Fat plastic tubes				4				
Post it note				1			2	
pipette tip box								1
Plastic pieces	12			10	1			3
parafilm pieces				9			10	8
skinny falcon tube		4	5	3		1		
weing tray					5			
plastic pipettes		22		9	2			3
plastic pipette wrapper		21		9	1			3
chem wipe	124		14	8	30	4		
small filter tubes				14		6		
piece of tape					1		6	
plastic culture tray	10							
plastic tray rows			3	3		3		
absorbant sheet						1		2
wax paper					3			
plastic dropper					2			
magazine							1	
styrofoam		1				1	1	
falcon tube	3	9					1	
plastic test tubes				14		1	48	
plastic syringe							2	
plastic bottle		1						
falcon tube wrapper				3				
syringe wrapper				3				
needle wrapper				1				
rubber band				1				
wooden stick				3				
graph paper/plastic	6							
misc plastic wrappers	3							

VIII. Recycling Audit Data - 2/24/15

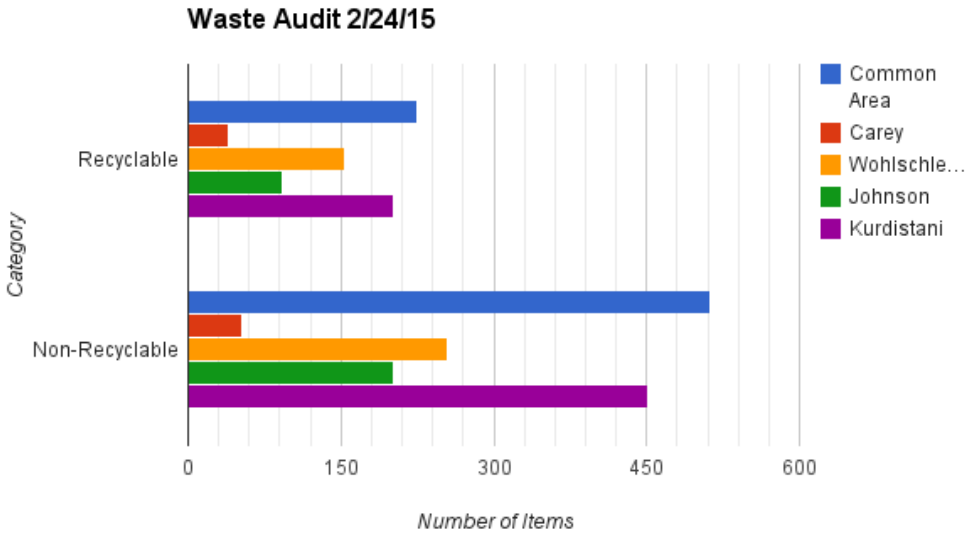
Item	357	354
large cardboard pieces	6	
cardboard box small	3	7
pieces of paper	16	29
rubber gloves (non-recyclable)	2	
paper cups	2	
aluminum can	1	
styrofoam plate	1	
napkins	4	
coffee sleeves	1	
plastic gallon jug		2
plastic water bottles		3
magazine	1	5
plastic bags		4
plastic wrapper (equipment)		4
clean paper towels		6
shipping plastic packing		1
pipette tip boxes		8
bags of unused plastic lab equipment		4
paper folder		2
mailing envellope		1
cardboard shipping container		4
Total number of items:	**37**	**80**

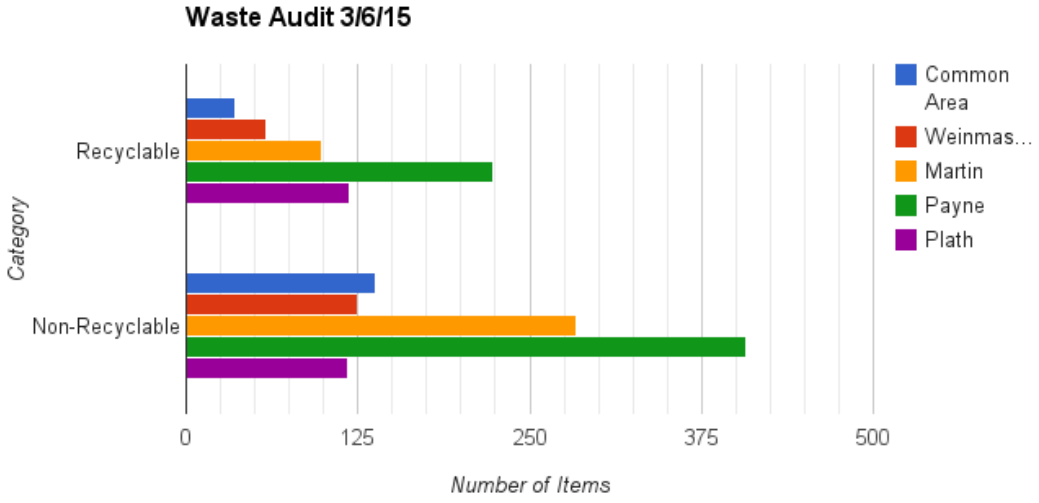
IX. Compilation of Waste Audit Results

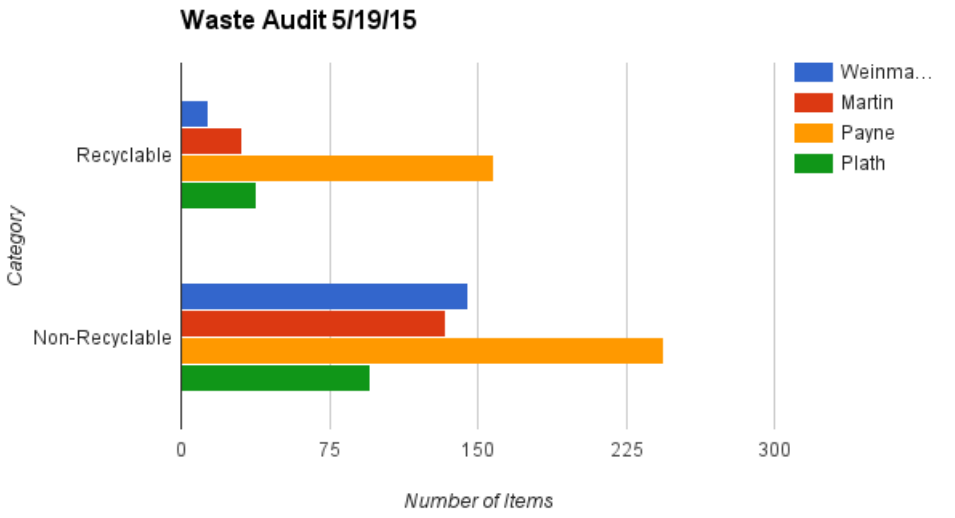
354 Final	Weinmaster	Martin	Payne	Plath
Recyclable	**14**	**31**	**158**	**38**
Non-Recyclable	**145**	**134**	**244**	**96**

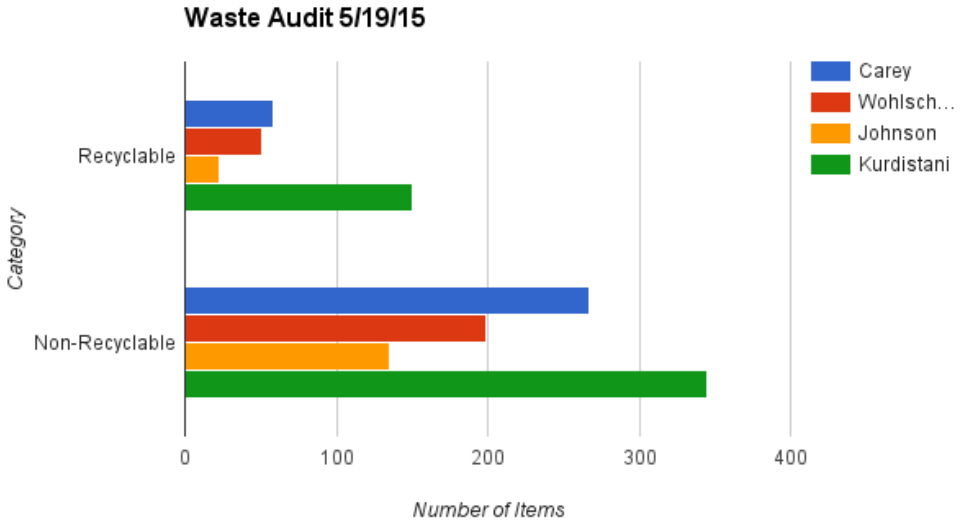
357 Final	Carey	Wohlschlegel	Johnson	Kurdistani
Recyclable	**58**	**51**	**23**	**150**
Non-Recyclable	**267**	**199**	**135**	**345**

X. Preliminary Waste Audit Data Visualizations

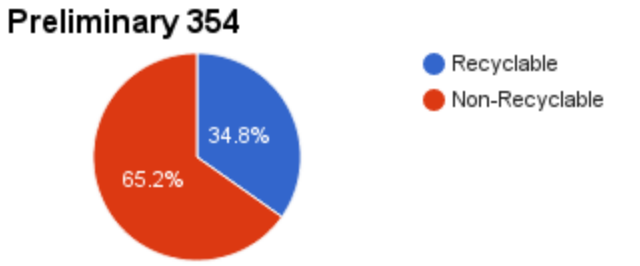


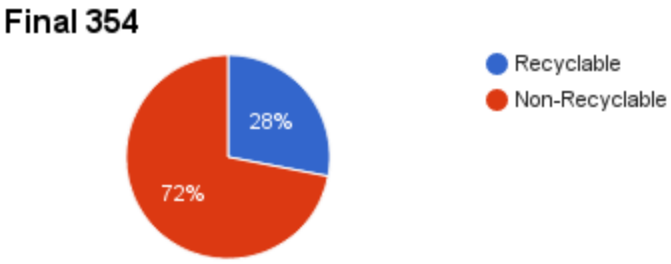


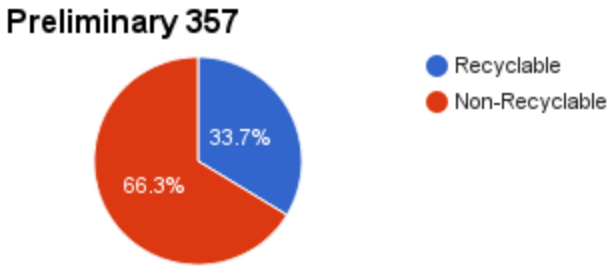

Waste Audit 5/19/15
Weinma...
Martin
Payne
Plath
Recyclable
Non-Recyclable
Category
0
75
150
225
300
Number of Items

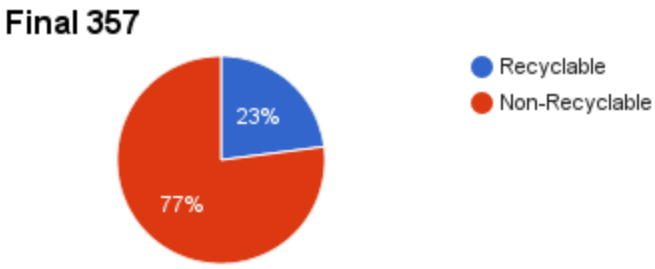

Waste Audit 5/19/15
Carey
Wohlsch...
Johnson
Kurdistani
Recyclable
Non-Recyclable
Category
0
100
200
300
400
Number of Items

XI. Comparison Visualizations of Trash Bin Waste Audits

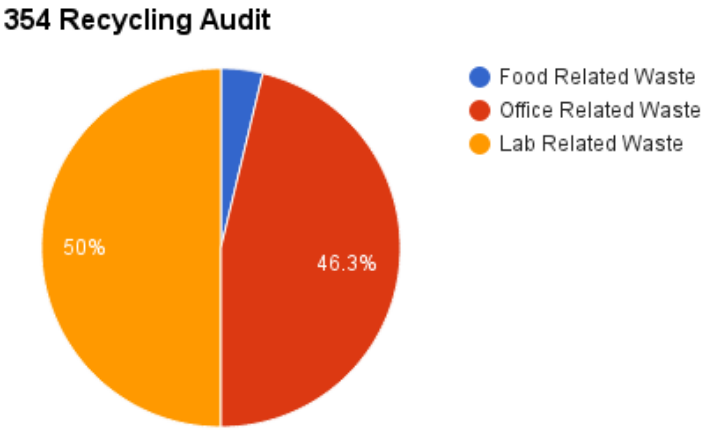


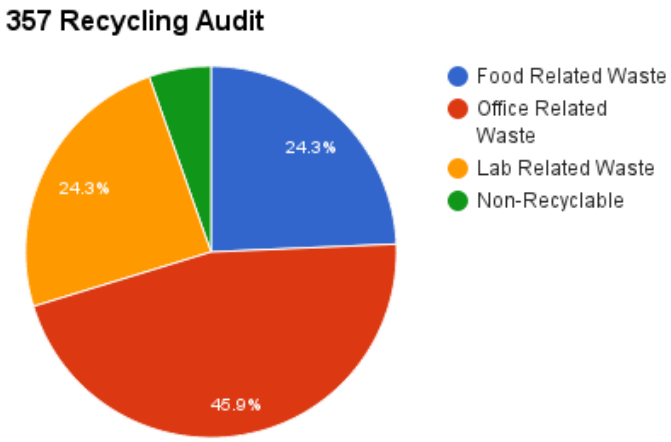






XII. Post-Implementation Recycling Bin Data Visualizations

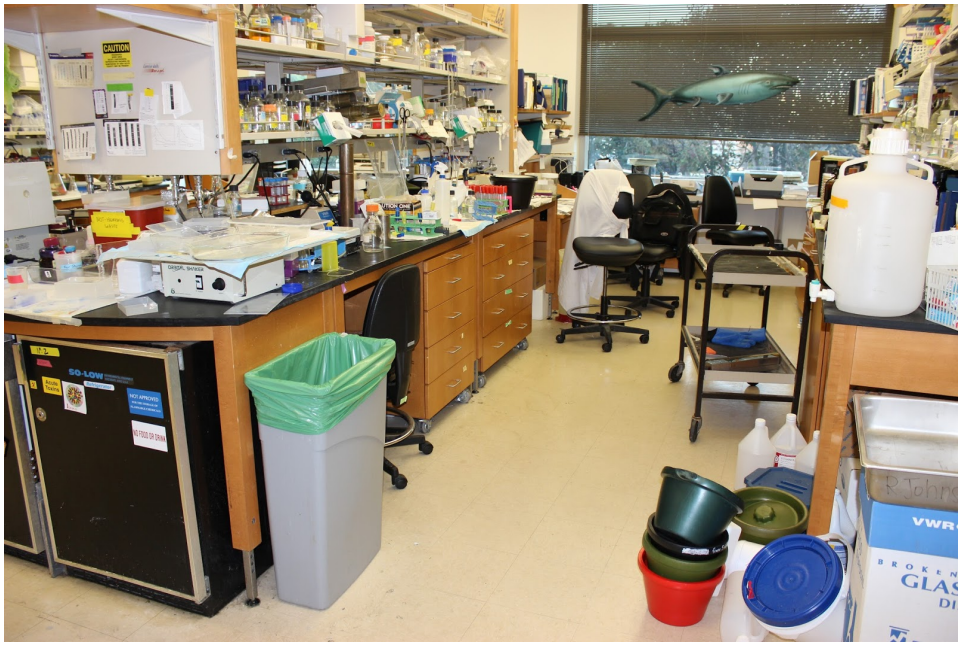




XIII. Cardboard Box Mini Study Results

Date	Box Count	Dimensions	Location (Room #)
5/18/2015	1	12" x 4.25" x 7"	357
5/18/2015	1	8.5" x 4.25" x 7"	357
5/18/2015	1	12" x 21.25" x 12.75"	354
5/19/2015	1	17" x 15" x 20"	354
5/19/2015	2	8" x 10" x 7.5"	354
5/20/2015	1	24" x 18" x 18"	357
5/20/2015	4	18" x 8" x 8"	357
5/21/2015	1	23" x 8" x 10"	357
5/21/2015	1	23" x 6" x 11"	357
5/21/2015	1	11" x 5" x 5"	357
5/21/2015	1	10" x 7" x 11"	357
5/21/2015	1	6" x 10" x 20"	357
5/21/2015	1	8" x 5" x 3"	357
5/22/2015	1	24" x 18" x 18"	354
5/22/2015	1	18" x 9" x 10"	354
5/22/2015	1	18" x 8" x 8"	357

XIV. Waste Audit Images

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