Report to Boulder Valley School District
Food Waste

Linnea Miller
Colorado School of Public Health
Fall 2017

Table of Contents

Introduction

The United States is in a large predicament regarding the future of our Earth. The global population is quickly rising and estimates show it reaching over 8 billion by the year 2025.[1] Our food systems need to adequately support this number of people, while also considering the amount of food being wasted. Nearly 1/3 of all food that is produced, or 133 billion pounds, is wasted annually.[2] This horrific problem is not only wasting extreme amounts of money through food growth, production, and removal, but there are also environmental concerns, along with millions of Americans facing hunger on a daily basis. In order to continue producing the amount of food necessary to sustain a growing population, issues such as deforestation, overuse, and lack of new land to cultivate food on needs to be addressed.[1] In addition, discovering why consumers, retailers, restaurants, and more throw out food and how to stop this waste from increasing is vital. Both issues of obesity and malnourishment are concerns within the United States, and tackling food waste could help to improve both. Boulder Valley School District (BVSD) has done extensive research on improving school food choices and offers amazing options to students grade Kindergarten – 12th. There is a need to now focus on reducing school food waste to continue creating a healthier community. The following will provide baseline observations and data collected from schools in BVSD and suggest guidelines for educational and messaging campaigns to reduce school food waste within the district.

Food Loss and Waste

Largest food wasters
(per person per year)

Saudi Arabia
427kg

Indonesia
300kg

US
277kg

UAE
196kg

Methane from food in landfills is
21 times more damaging
than CO_2

Reducing US food waste by 20% over 10 years would cut
18 million tons
of greenhouse gases annually

In **rich countries**, consumers waste most food

In **developing countries**, food losses occur before reaching the consumer

One third of the world's food,
1.3 billion tonnes
is lost or wasted at a cost of
$750 billion
every year

Meanwhile,
795 million people
are going hungry

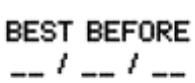
The carbon footprint of food waste accounts for about
3.3 giga-tonnes
of greenhouse gas emissions, which is equivalent to one third of annual emissions from fossil fuels

If **one quarter** of the food currently lost or wasted were saved, it would be enough to feed the world's hungry

Top 3 / Lowest 3 Performers
in reducing food loss & waste

TOP PERFORMERS	LOWEST PERFORMERS
1. France	23. United Arab Emirates
2. Australia	24. Indonesia
3. South Africa	25. Saudi Arabia

Responses



Clearer expiration date labels

Donations from food retailers

Consumer education

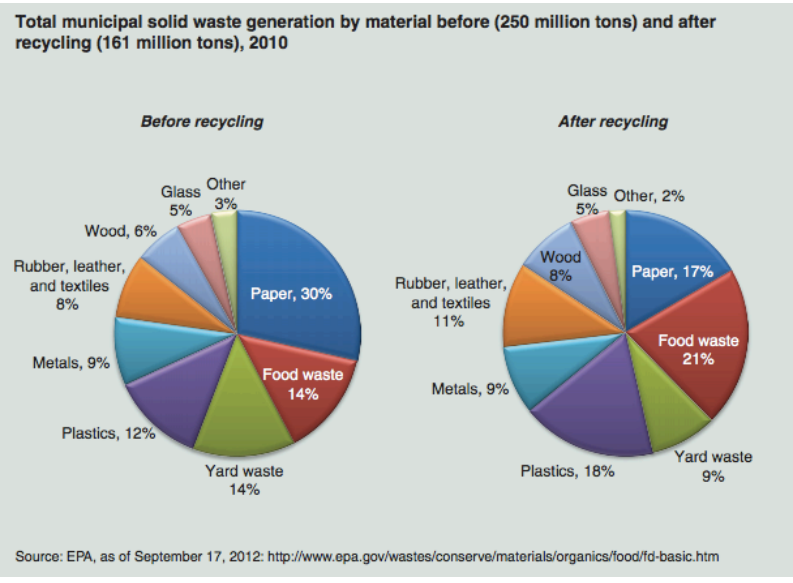
Reduction of food losses

Data from Food Sustainability Index and others[1]

What Is Being Done

When “food loss” is referred to, it is describing any food after being harvested that is offered for human consumption, but it is not eaten. This could be for a variety of reasons and includes issues such as cooking loss, moisture loss, becoming moldy, eaten by pests, poor climate control, and plate waste.[2] Food waste is a part of food loss and happens when any type of edible food goes uneaten due to being thrown out by retailers for a number of reasons or plate waste by the public.[2] Retailers may choose to throw out food because of an expired ‘best if used by date’ or if the food is unattractive.[2] There are many problems when it comes to food loss as it not only represents a loss of money, but many other resources used in this country. When you think about the process of how food gets to your dinner table, it has to start out being grown somewhere. Resources necessary to do so include land, clean water, cost of labor, and some form of energy.[2] The food needs to be harvested, transported, sold, and ends up ready to be consumed. If the food is not consumed, there is the cost of transporting it to landfills and the environmental implications that the food has once it is thrown in a landfill for the foreseeable future. The cost of moving food to a landfill exceeded over $1.3 billion in 2010![2] The following image shows that food waste was the largest amount of waste after recycling paper.

Through the Environmental



Protection Agency (EPA), there is a huge focus on sustainable management of food. The EPA has developed the *United States 2030 Food Loss and Waste Reduction Goal*. Two of the main reasons for doing so are that reducing food waste will help reduce total US methane emissions that come from landfills (addressing climate change) and work towards reducing the 42 million Americans who are living in food insecure homes.[3] The combined effort of the EPA and United States Department of Agriculture (USDA) will aim to work with communities, organizations, and businesses within state/local/tribal governments with the ultimate goal of reducing food waste by 50% or more through 2030.[3]

School districts have a vital role in the future of food waste. Since children spend most of their early life in schools, this is the perfect opportunity to educate the future generations on how to reduce food waste and why it is of high importance to do so. They can be taught about recovering food for donation and how to help preserve our limited natural resources.[4] The USDA is offering schools to join their US Food Waste Challenge, which is a combination of all organizations from farms to grocery stores to schools, coming together to share information on how they are working to reduce food waste.[4] This will create an inventory of best practices that can be used by others in the country. Many schools have adapted the Smarter Lunchroom Movement suggestions, which not only help students eat healthier, but can reduce food waste.[5]

Colorado is doing a lot when it comes to reducing food waste. As a state, Colorado tends to be very interested in the environment and healthy lifestyles, so it is not a surprise that many resources are being used to combat food waste. Denver Food Rescue, Boulder Food Rescue, Colorado Food Recovery Network, and Foraged Feast

all help to save food that would otherwise be thrown away and donate to the underserved or low income areas in need.[3] A federal law, the Bill Emerson Good Samaritan Food Donation Act (1996) and the Colorado state law, C.R.S. §§ 13-21-113, both protect donors of food from liability. These are extremely helpful in encouraging groups and organizations to consider donating leftover food to those in hunger. Many restaurants and school districts have started placing a focus on composting and recycling, government agencies are trying to make food waste a priority, and other non-profits are working to either reduce food waste or ensure successful donation of food that would otherwise be discarded to those in need.

Numerous for-profit organizations exist as well including, MM Local Foods which works with farmers to can fruits and vegetables post-harvest that otherwise would go bad, and A1 Organics that uses organic recycling and food waste recycling to create products available to Colorado citizens to use in landscaping.[6] Although many communities are now emphasizing composting food, it is not the top way to decrease food waste, especially if you let good food go bad in your own fridge. Making sure that the public is informed on buying smart while shopping and eating or using all food bought should be a top priority.[6]

National School Lunch Program

The National School Lunch Program (NSLP) is where schools receive federal funding for the lunches that they serve. NSLP has set standards on calories per meal, limits on various nutrients in meal items, and what students must take when leaving the lunch line. They recently incorporated “offer vs. serve”, which gives students more flexibility in the items they take. However, there is nothing that makes the students

actually consume what they take. During school lunch, up to 60% of fresh vegetables and 40% of fresh fruit is not consumed and thrown out.[7] The unintended outcome of requiring schools to serve fruits and vegetables to students is that a lot of it gets thrown away and creates an exorbitant amount of food waste. Studies have shown that waste may be over $5,000,000 a day amongst all the schools that receive funding from NSLP.[7]

Many of the BVSD kitchen staff question the necessity of forcing students to take fruits and vegetables form the lunchroom, citing numerous issues for lack of consumption including no exposure at home, confusion about what the food is, and cultural differences. Numerous children will tell the staff that they are just going to throw it out, but what can the staff do? This issue would have to be thrown back at the NSLP policy and evaluating whether "offer vs. serve" and providing fruit and vegetables to children is really increasing their nutrition, or simply creating more food waste.

Green Star Schools

Eco-Cycle is a non-profit located in Boulder Country, Colorado that is focused on recycling and has a passionate belief to find ways of conserving natural resources. They work with the community and schools to help create the most sustainable environment possible. They also work to educate the public on what can be recycled, composted, or has to be thrown in the landfill and why it is important to recycle and compost. The Green Star School program began in 2005 with four schools in Boulder. The goal of this program is to encourage schools to move towards Zero Waste and implement recycling, composting, and special waste reduction activities within the

school.[10] Today, there are over 46 schools enrolled in the program and helping to reduce landfill waste in Colorado. Some goals[10] include:

-Using reusable plates, silverware, trays

-Composting any food or paper products (that are approved)

-Encouraging students to bring waste-free lunches from home

-Placing bins all through the school to be used outside of lunch hour

-Educate students on Zero Waste

Of the schools where data was collected, Columbine Elementary and Casey Middle School are the only two that are certified Green Star Schools. A few of the others are on track to become certified in the coming school years.

Why collect data and what to do with it?

In order for BVSD to implement future education and messaging regarding food waste, formative baseline data needs to be collected. The data collected will include information from 2 elementary schools, 2 middle schools, and 2 high schools. Only one day of data will be recorded from each school. The purpose of this study is to explore and understand excessive food waste among students in Boulder Valley School District in effort to guide future educational programs and messaging to reduce Food Waste in BVSD.

Elementary Schools

Columbine Elementary School

Columbine Elementary School is a Green Star School and has a Growe Garden and Greenhouse on campus. There are approximately 536 students (including

preschool which data was not collected on) and around 65% of the population is on Free and Reduced Lunch. Columbine has a wonderful set-up for the cafeteria. There is a clear path to the lunch line, where students will first get their entrée and then move through the salad bar to the check out. The milk and water station is located across the cafeteria. Students all use a blue tray that has different indentations to place their food along with real silverware and cups. When students finish their meal, they should follow the outside path around the tables to discard their liquids first (in a bucket), place the cup in the tray, and then there is a large yellow recycle bin, a grey landfill bin, and three white compost bins to dispose of their lunch items (See Appendix E).

The data was collected from Columbine Elementary School on Monday, September 25th, 2017. Lunch hour begins for 5th grade at 11:15 AM and concludes with 2nd grade around 12:45 PM. The lunch for the day was a meatball sub sandwich, pepperoni pizza, or cheese pizza. On the salad bar, kids had the choices of lettuce, cottage cheese, celery, carrots, zucchini, eggs, hummus, apples, and jalapeños. Majority of students left the lunch line with the sub or pizza, and carrots or the apple. Many went for milk to complete their meal. No boats were used to serve any food items, so the weight of compost in the data is simply food. If students brought lunch from home, majority of what was thrown in the landfill bin included Lunchables packaging, juice boxes, yogurt containers, and plastic bags.

Food that got thrown in the compost included full sandwiches, just buns, crusts from pizza, whole pieces of pizza, and lots of whole apples. All grade levels were served the same amount of food, but it was interesting that some of the younger grades

consumed more of their food. It could be that the older kids are more concerned with getting to recess or talking to friends.

The table below shows how much compost was produced by each grade level in pounds, along with the total weight of the compost. The amount of compost produced by each grade level is relatively equivalent ranging from 5.9 to 10.4 with an average of 8.98 pounds. The 5.9 pounds collected during 1st grade lunch might have been a slight bit off as 3rd, 1st, and 2nd grades all eat around the same time and could throw away food together. In addition, the total amount of recycling, landfill, and liquid waste was recorded after all lunch hours.

Grade	Compost Waste Before (in pounds)	Compost Waste After (in pounds)	Total Compost Waste (in pounds)	# of lunches sold	# of students present
5th	17.4 (empty bins)	27.8	10.4	42	73
K	27.8	36.8	9	42	76
4th	36.8	47.2	10.4	44	84
3rd	47.2	55.2	8	35	74
1st	55.2	61.1	5.9	51	80
2nd	61.1	71.3	10.2	55	83
Total			**53.9**	**269**	**470**

Total Recycling Waste		**2.0 pounds**
Total Landfill Waste		**5.6 pounds**
Total Liquid Waste		**19.1 pounds**
		*Any waste amount measured before the lunch period includes the weight of the bin and breakfast or other items disposed before lunch hour.

If the food being served requires ketchup or other condiments, the food service staff will monitor the use of this to reduce waste. Kids can choose what they want from

the self-serve salad bar and really do a great job of controlling what they take. The staff constantly reminds them that they should take a little to start and if they finish and are still hungry, they can return for more. This way, most do not overindulge from the salad bar and waste can be curtailed. Some additional ways that food is wasted include students dropping their tray, food missing the tray when being served from the salad bar, and students goofing around at the lunch tables throwing food or dropping more on the floor. On occasion, there are days when students bring a lunch from home and then get a school lunch as well. Clearly, this produces more food waste because they end up eating only one of the lunches. Staff tries to prevent students from doing so, but if they are free and reduced lunch, or paying, they cannot stop a child from getting a school lunch.

Constant training and re-teaching is necessary by staff at Columbine, especially for the younger students. If a student is consistently taking too much from the lunch line, they are reminded that they can come back for more, versus taking too much in the beginning. If the custodian, Ennis, can be near the clean up stations, he will give friendly reminders if a student throws waste in the wrong bin. Also, students often were asking which bin they can throw certain items in. Overall, the students are pretty well trained and have a great relationship with Ennis. This seems to increase their willingness to follow the guidelines in order to please him. Many students go up to Ennis to show their empty trays and appreciate his praise.

However, there are many students who fail to toss their items in correct bins: forks in the recycling bin, recyclables in the landfill bin, and/or food in recycling or trash bins. Part of the problem may be that the flow or path that students should follow to

throw away items is not always followed correctly. Students end up in mass groups and that complicates how everything is discarded. In addition, students tend to be in a rush to get outside for recess and do not take the time to think about which bin items should go in. The younger students could benefit from clear signs with detailed pictures showing what goes where.

Some positive things regarding food waste going on at Columbine include the many signs around the cafeteria promoting food waste reduction and healthy eating. Every day on morning announcements a reminder is given to all the students to do the following: take only what you can eat, eat what you take, and separate foods according to compost, recycling, and landfill properly. The positive relationship that Ennis has built with the students has extended to the parents. They support him and due to this fund many projects for the school. Perhaps they can be a resource for reducing food waste in the future. As far as students bringing lunches from home, it was interesting to see that most have lunch boxes that have built-in containers. If not, in many cases Tupperware was used versus plastic bags. It did not appear that liquid waste would be as large as it was considering that the milk and water are self-serve in a glass. Students have full control over how much they take, but a lot was wasted.

Alicia Sanchez International Elementary School

Sanchez Elementary School has a Kitchen Community Garden located across the street from the school and is planning to become a certified Green Star School by the end of the 2017/2018 school year. There are approximately 400 students (including preschool which data was not collected on) and around 71% of the population is on Free and Reduced Lunch. The lunch room is relatively small and each grade level for

the most part has lunch on their own times. Each student is given a dark or light blue plastic tray to put his or her food on. The serving area is a bit crowded, as students have to make a "U" to get the entrée and then curve around to the salad bar. There is only one salad bar so it can get a little backed up with impatient students. After students check out, they can get milk or water that is located across the cafeteria, although not many did this with an average of 6 students having milk per grade level. Students are dismissed in groups to throw out their food, but doing so creates chaos at the disposal area. Since Sanchez has not been certified a Green Star School, they do not do composting. When talking with staff, they are hoping to begin implementing compost in January 2018. The only options available are liquid waste, landfill, and recycling. There was a bucket for liquids, a large yellow recycling container with a small hole cut out of the top, and two grey trash cans.

The data was collected from Sanchez Elementary School on Tuesday, September 26th, 2017. Lunch hour begins for 4th grade at 10:45 AM and concludes with 5th grade around 12:35 PM. Each grade has around 20 minutes to eat, though by the time they get their food and sit down, usually there is only about 10-15 minutes to eat and socialize. The lunch for the day was a hot dog served with baked beans or a veggie burrito. On the salad bar, kids had the choices of lettuce, yogurt, celery, carrots, cucumbers, quinoa salad, hummus, raw peppers, chicken, cut watermelon, and cut cantaloupe. For the most part, students were taking the hotdog, with cantaloupe and/or watermelon, carrots, and lettuce. No boats were used to serve any food items, so the weight of compost in the data is simply food. Although most of the students took a school lunch, those that brought lunch from home had a lot of plastic bags and

containers for gogurt, juice boxes, fruit or pudding cups, dessert items, and chip bags. Not many had the nice containers for home lunch items and this creates a lot more waste.

There was no compost available for the students so leftover food was thrown away or taken home in lunch boxes (if brought from home). Food that got thrown out included immense waste from the salad bar – many students took way too much food and were unable to consume it all, lots of buns, and condiments (ketchup and hummus). In addition, hardly any students touched the beans. In speaking with Alonzo, he commented that the students are mostly Hispanic and are not used to this type of "baked beans'. The recycling bin was not utilized much and the small hole seemed difficult for students to get their items in to.

The table below shows how much landfill waste was produced by each grade level in pounds, along with the total weight of the landfill waste. The liquid waste was disposed of at random intervals so a correct weight of the liquids was unavailable. The most shocking part of the table is that almost all of what was thrown into the landfill bins was compostable and mostly food scraps. If composting was used at Sanchez it would have been almost 100 pounds today alone!

Grade	Landfill Waste Before (in pounds)	Landfill Waste After (in pounds)	Total Landfill Waste (in pounds)	# of lunches sold	# of students present
4th	14.7	30.2	15.5	46	62
1st	13.4	36.9	23.5	43	60
K	13.4	23.7	10.3	49	65
2nd	16.0	34.5	18.5	35	51

3rd	13.4	26.9	13.5	25	38
5th	26.9	44.1	17.2	46	57
Total			**98.5**	**244**	**333**
			*Any waste amount measured before the lunch period includes the weight of the bin and breakfast or other items disposed before lunch hour.		

Food waste to the staff at Sanchez has two parts; one is the kitchen waste and the other student waste. In the kitchen Angie works hard to cut down on food waste as her background really enforced this. She is from Taiwan where they only have small amounts of land for landfills and to throw away items is extremely expensive. Compost and recycling is all she knew before coming to the US. Her high value on both is great for Sanchez Elementary School because she has made it a personal goal to decrease food waste on the kitchen end. The salad bar items can be reused for varying amounts of time depending on the product and condition. Any food that can be reused in a basic or creative way is done (whole fruit cut up or yogurt from breakfasts put on salad bar), she recycles the paper bags that many foods are delivered in to supermarkets and tries hard to enforce on the kids “Take what you’ll eat, eat what you take”. The younger kids tend to be easier to work with at Sanchez as they enjoy the colorful fruits and vegetables and the staff focuses on them when teaching rules of the cafeteria. The older students at Sanchez have an attitude that does not show that they respect the food or what they are being told to recycle. This might be a struggle when composting is introduced.

Another way to reduce food waste from the kitchen is to really be mindful when ordering. If during the first cycle of 6 weeks, on meatball sub day 200 were ordered and

30 were left, for the next cycle ordering less will be advantageous to reducing waste. It takes a lot of time and investment to truly put focus on reducing food waste so you have to get the entire community involved and committed to the cause.

The assistant to the principal said that not many of the staff know about the composting yet but she is positive that they can make it work. She is unsure how they will feel about it, but considering Boulder is very eco-friendly has high hopes they will be on board. The atmosphere of the school and attitudes of students make it seem like it will be a challenge to introduce composting, but hopefully with the right supports they can be successful. Composting will enrich each student's life daily and for the future. The biggest need is to educate the students on why composting is important and also why wasting food is unacceptable. It will be particularly time consuming for a few weeks or months, but the end results will help members of the Sanchez Elementary School community to feel pride in what they are doing.

Some issues at Sanchez Elementary are that there is an extreme lack of volunteers, paraprofessionals, and aides to help during lunch hours. The food service staff has such limited time with the students that they cannot be teaching and re-teaching them throughout the school year. Without having reinforcement to remind students what to throw away and recycle, everything ends up in the trash. If they want to introduce compost at Sanchez, there definitely needs to be an increase in staff or volunteers present in the cafeteria to help guide students. The disposal area is very crunched and students have a hard time dumping their liquid waste without spilling their tray of food. This creates a huge mess for Alonzo after each grade level and a dangerous situation for students coming through the line.

Middle Schools

Casey Middle School

Casey Middle School is a Green Star School that recently celebrated its 5 year anniversary and has a Kitchen Community Garden. There are approximately 683 students in grades 6 to 8 and around 36% of the population is on Free and Reduced Lunch. The atmosphere for the lunchroom is much different than that of the elementary school lunchrooms. Casey has an open concept lunchroom, where there is not a distinct walled-in area and students are free to mill around the space, as well as head outside during the 30-minute period. Each student can take a large tray and either a reusable plate or bowl to place the food in. Real silverware was being used, but with supply running low, most are now plastic.

The set-up for the food has pros and cons; two separate lines to obtain the hot food separate the students, however, there is only one salad bar that tends to back up the lines. Once the students have received both entrée and salad bar options, they move to the check out register and milk or water is available immediately. Once finished eating, students can either use the compost and recycling containers located in the main area of the lunchroom, or head to the tray disposal area where there is a room to compost, recycle, or throw trash away. In addition, a small share box is located in this room.

The data was collected from Casey Middle School on Friday, October 6th, 2017. There are a total of three lunch periods, with a mix of students from grades 6 – 8, lasting approximately from 11:07AM – 12:59PM. Lunch choices included chicken potstickers with fried rice, spaghetti and marinara sauce, or shredded pork tacos. Each portion was a very good size and appropriate for the age group. On the salad bar, students could

take the following options: lettuce, cottage cheese, celery, carrots, jalapeños, black beans, cucumbers, tomatoes, cut cantaloupe wedges, and some different types of premade salads. When walking around the lunchroom after students picked their food, there was quite a variety chosen for the entrée, but as far as salad bar options, if anything was taken it was the cantaloupe and/or a tiny salad. At the middle schools, students can purchase La Croix or Coconut Water in addition to the milk and water offered. There were quite a lot of students with lunch from home.

Food that got thrown in the compost included immense amounts of the fried rice and cantaloupe rinds. For the most part, students did a great job of consuming the actual fruit part. Unfortunately, also in the compost bin were unacceptable amounts of plastic bags, wrappers, plastic containers, other trash and recycling products and many of the cafeteria's reusable plates, bowls, and silverware.

The table below shows how much landfill, compost, and recycling waste was produced during the lunch periods. There is no differentiation between grade levels as they all ate together and one end number was recorded. During lunch, the students had a lot of freedom to come and go as they pleased, eat when they wanted, and socialize in or outside. Some students may have thrown food away outside and that was not counted in the data.

	Compost Waste Before (in pounds)	**Compost Waste After (in pounds)**	**Total Compost Waste (in pounds)**	**# of lunches sold**	**# of students present**
6th – 8th	32.5	95.6	**63.1**	257	619
Total Recycling Waste			**3.5 pounds**		
Total Landfill Waste			**31.3 pounds**		

		*Any waste amount measured before the lunch period includes the weight of the bin and breakfast or other items disposed before lunch hour.

There were a few signs around the cafeteria that talked about food waste and why it is important to reduce it, but more would be helpful, especially larger ones. The disposal room had great signs indicating which items should be thrown where, as well as a large sign with actual products taped to it for the compost bin. During lunchtime, the students are rushed when going through the salad bar (by friends or their own desire to get outside, talk with friends, etc). Since there is only one bar, students are pressured to move quickly through the line and end up not taking very much. This, in combination with lack of knowledge of what items are on the salad bar, show that the students need education about healthy foods and what they might like. If they are not exposed to the types of foods found on the salad bar at home, they might be tentative in trying anything new.

In talking with the kitchen staff, many felt that they try to reduce food waste as much as possible. With the new "Lean Path" system, which consists of a tablet connected to a scale, the staff can accurately see how much they are wasting, where it is going, and the money lost. Every item they will toss can be entered on the tablet and records will be kept for each day. They are working to reduce the amount of trimmings they compost and ensure consistent walk-throughs of the kitchen to freeze or use any items before they expire. The KSL, Dignora, makes sure to monitor what she actually heats and cooks based on estimates for how many students will eat, because once it is heated, it has to be thrown away. The kitchen and BVSD as a whole is serving food

that is healthy for the students, but focus needs to be on the other half of the equation and what happens after.

Overall, while discussing the issue, it seems the school community does not value decreasing food waste very highly. There is a lack of support and teaching for the students to ensure that they know what gets thrown where and actually follow through with it. Majority of the kitchen staff and custodian, Alberto, have too many tasks they are working on that they are unable to help promote a decrease in food waste. A teacher or paraprofessional (sometimes even a Green Star School volunteer) is supposed to be in the disposal room, but during this lunch period only for a brief time during the last 30 minutes was someone helping the students. The compost and recycling bin that are in the main cafeteria area do not get utilized correctly. It may be due to the location of the main disposal area, but most try to use these bins and end up throwing most trash in with the compost instead of walking to the trash bin. It is very unfortunate that this occurs because all of it might end up being thrown in the landfill. Due to most of the silverware going “missing”, now plastic silverware is being used which just adds to the waste.

Middle School aged children do not like to do what they are told and tend to listen better when it comes from their peers. Kitchen staff suggested that having school clubs or groups that focus on food waste and why it should matter to the students might be a positive step. Giving students a voice in the matter will make them feel important and give them control over the situation. They can find what works best to motivate their peers in wanting to improve the food waste situation. The students at Casey really need to understand what is compost and recycling, and then actually take the time to

separate their waste in to the correct bins. In order to get more staff on board with decreasing food waste, more knowledge and education could be useful so that they promote this to the students.

Even though Casey is a certified Green Star Schools, the values held by a GSS are lacking. It is great to have separate bins for landfill, recycling, and composting, but if the students are not going to use them appropriately, and the staff is not enforcing it, then it really is a losing situation. Perhaps Eco-Cycle needs to revisit with Casey and develop some more training for the staff and students in order to bring everyone back on board with reducing food waste again.

Angevine Middle School

Angevine Middle School has no specific distinction regarding the cafeteria and food topics, however the plan is for the school to obtain Green Star School status throughout the 2018-2019 school year. There are approximately 662 students in grades 6 to 8 and around 45% of the population is on Free and Reduced Lunch. The cafeteria is set up with all tables on one side and the food area on the other. Students can get in one of two lines to obtain their main entrée (through a doorway into the kitchen), and then filter out of the kitchen to one salad bar and a cashier. The water and milk are in separate locations, but both close to the end of the lunch line. All students use a flat tray to take the food they would like and a mini-boat can be used for salad bar items if desired. Most of the silverware is real, however plastic is mixed in due to a loss of silverware. At the end of lunch, when it is time for recess, all students are dismissed at once to dispose of their waste. There are two separate locations to do so, one near the kitchen with two trash bins and one recycle bin, and another location near the cafeteria

exit with a recycle and trash bin. Cup disposal is right by the window where students will leave their empty trays, however no liquid disposal area is evident.

The data was collected from Angevine Middle School on Monday, October 9th, 2017. All of the 6th graders eat together from 10:25 – 10:50AM, and then a mix of 7th and 8th graders eat during 11:15 – 11:45AM or 12:05 – 12:33 PM. The lunch for the day was a crispy chicken sandwich, pepperoni pizza, or cheese pizza. On the salad bar, kids had the choices of lettuce, cottage cheese, celery, carrots, hummus, chicken, chickpeas, applesauce, peas, full plums, and jalapeños. In observing what students took for lunch, there was a good mix of pizza and chicken sandwiches with salad bar items being lettuce with dressing, plums, and lots of applesauce! The applesauce disappeared within minutes of the 6th grade lunch. A lot of students drank water with a small amount each period drinking milk. Mini-boats were offered to students for use at the salad bar, so this waste is included in the data, but it is important to point out that not all students did take one. Students that brought lunch from home had lots of plastic bags, Capri Sun, Gatorade, lunchables, juice boxes, and yogurt containers. Some did have nice Tupperware with reusable drink containers.

There is no composting available at Angevine so the choice is either recycling or landfill. One thing to note about the recycling bins is that there is only a tiny hole in the top and appears to be for cans only. This creates an immense amount of other recyclable items being thrown in the trash. Typical items that were seen thrown away included lots of the buns from the chicken sandwiches, pizza crust, heaps of extra BBQ sauce or ranch dressing, entire plums, and packaging. In addition, the plastic wrap that the entrées were served on and mini-boats were tossed also.

The table below shows how much landfill and recycling waste was produced during the lunch periods. There is no differentiation between grade levels as two out of the three periods were mixed students and one end number was recorded. It was a snowy day so a lot of students seemed to stay inside versus going out for recess, resulting in a longer time to consume their food.

	Recycling Waste Before (in pounds)	**Recycling Waste After (in pounds)**	**Total Recycling Waste (in pounds)**	**# of lunches sold**	**# of students present**
6th – 8th	28.4	29.0	**0.6**	**223**	**633**
	Landfill Waste Before (in pounds)	**Landfill Waste After (in pounds)**	**Total Landfill Waste (in pounds)**		
6th – 8th	72.3	147.9	**75.6**		
			*Any waste amount measured before the lunch period includes the weight of the bin and breakfast or other items disposed before lunch hour.		

In starting my observation, numerous staff members said it was not a good day to be there because of the menu options: pizza and chicken sandwiches. They felt these are two of the kids' favorite meals so not a lot of waste would be produced. Other meals they feel kids truly enjoy are nachos and burgers. Days that there seems to produce more waste were unanimously any pasta day. Considering the population at Angevine is heavily Hispanic, a focus more on the types of food these students are accustomed to eating, might entice them to eat more, as seen on nacho day. Or perhaps even calling certain items by alternate names that would appeal more to these students such as "tortas" instead of "sandwich". Kitchen staff is trying to reduce their own food waste by being conscious when ordering items, cooking items, and freezing

items. Carlota does a great job of estimating how many entrées will be eaten and freezes the rest for use at another day. For today specifically, Carlota cooked a total of 258 meals (less than what she ordered) and 232 meals were taken. That is only 26 wasted versus if she had cooked all that she ordered!

Within the school, food waste does not appear to be a main priority. In speaking with other staff during lunch, there seems to be a consensus that something should be done, but they do not know what and how to implement it. Nothing is actively being done at the present moment except for the addition of a SHARE table. The only caveat with this is that students do not know what it is, where it is, or how to use it. Most whole plums were simply thrown out. The cafeteria is definitely lacking signs promoting food waste reduction and the only one that is inside the lunch line in the kitchen, gets reactions from students that actually read it. They cannot believe the amount of food wasted, so if these posters and signs were posted all around the cafeteria, more students would get a chance to see them. The kitchen staff is sickened by the amount of food waste, but again feel that it is a problem with NSLP guidelines and making the students take a certain amount of food. Many students seem confused as they are told not to take things they will not eat, but then get told they have to take “x” amount of items. Many will even say immediately that they will throw it out, but the staff can not do anything about it. The fruit is often one of the largest products of waste as students have to take it, but many will only eat a bite or so. There is the question of why students need to be told what to take. As adults, we do not get ready for dinner and have someone guiding us in what we need to put on our plate and how much. This would

never work! For the middle school population, kids know what they like and dislike, so forcing them to take certain items will just result in waste.

There are many opportunities for Angevine to work on decreasing food waste or even just bringing the topic to light. Students have been asking why Angevine does not do composting as many do at their homes. Since there is an interest, capitalizing on these students to lead the integration of food waste reduction would be ideal. The set up of the disposal area could be greatly improved. Having a flow from each "station" with signs would be extremely beneficial, including areas for liquid waste (currently no where for them to dump excess liquid), cup bin, silverware bin, recycling bin, and then landfill bin. More volunteers are necessary to assist during the lunch hour. Not only to control the behaviors of the students, but mostly to stand and direct students with how to dispose of trash. Many cans and bottles ended up in the trash as well as whole fruit. A simple reminder for students would save much of that recycling and fruit! Peers tend to listen to each other more, so having student volunteers or leaders monitoring waste disposal may increase compliance. This was being done, but for some reason disappeared. Utilizing Bobcat TV would be an easy avenue to reach all students. Friendly reminders providing some type of education or messaging daily regarding food waste and recycling would be advantageous. If Angevine is going to implement composting as a Green Star School, major training. education, and help is going to be required to get everyone ready to start.

High Schools

Boulder High School

Boulder High School is not currently a Green Star School and does not have any type of school or kitchen garden. There are approximately 2,048 students, freshman to seniors, and around 20% of the population is on Free and Reduced Lunch. The cafeteria recently was remodeled and has a very inviting atmosphere. The kitchen area students have access to is incredibly small and the line must form outside of the kitchen. This presents difficulty, as lunch tables are located where the lines need to form. As students enter the kitchen, they first have the salad bar, then pick an entrée, and finally can purchase La Croix or take milk. Water fountains are located throughout the cafeteria. Students have the option to take a tray, but most opt for just using the boats provided (both large and small). Plastic silverware is the only option as the real silverware was consistently thrown away. There is an open campus policy at Boulder High, which means that once students have their lunch, they can go anywhere on or off campus. There is also the option to get food from other places near school. For waste disposal there are endless options to throw landfill and recycling products. In the main lunch area, there are 8 landfill bins (black) and 7 recycling bins (yellow). In addition, more of the bins are located all around the school and outside, which may contain lunch waste. No composting is done on campus so all food waste and other compostable items are thrown in the trash and no Share table was present. Only one sign revolving around food waste was posted anywhere throughout the lunchroom – what to recycle placed on the side of a Snack Vending Machine over a recycling bin.

The data was collected from Boulder High School on Tuesday, October 10th, 2017. There are two lunch periods for all of the students with a 30-minute break in-between from 11:00 – 11:30AM and 12:00 – 12:30PM. Students who have open or

study periods are able to stay in the cafeteria during any time of the day. The lunch for the day included the options of a hot dog with baked beans, Fireside Broccoli and Cheese Stuffed Potato with a biscuit, or a Turkey and Cheese Croissant. On the salad bar, students had the choices of lettuce, cottage cheese, celery, carrots, hummus, apples, bell peppers, tomatoes, cucumbers, black beans, apple, banana, plum, and jalapeños. As stated before, each student was given boats to use for their food. Many had two or three in total, with lots of room to spare. The hotdogs were all wrapped in aluminum foil and the croissant sandwiches were in plastic wrap. The boats, foil, and plastic wrap all were part of the trash total.

Since high school students are older and do not have “recess”, there was not as much rush to get out of the cafeteria as seen in the younger grade levels. Many students were able to socialize and eat within the given amount of time. When observing the trash and recycling bins, the recycling bins stayed relatively empty while the trash filled up very quick. Most of what was thrown out included the boats, foil, plastic wrap, and many bottles, cans, and plastic containers – all of which could have been recycled. Although there definitely was food thrown in the trash, it was not the main part of the trash contents. Along those lines, most of the food tossed was either parts that could not be eaten or scraps, not whole items.

The table below shows the amount of landfill and recycling waste collected during the hours of 10:30AM – 1:00PM. This range is included and not specified as lunchtime because students came and went through the cafeteria, using the bins as needed. Furthermore, there are many students who take their lunch elsewhere during

the lunch period and may utilize other bins to dispose of trash that were not measured. A total of 8 landfill bins and 7 recycling bins were measured.

	Recycling Waste Before (in pounds)	Recycling Waste After (in pounds)	Total Recycling Waste (in pounds)	# of lunches sold	# of students present
9th – 12th	66.6	72.2	**5.6**	**330**	**1,960**
	Landfill Waste Before (in pounds)	**Landfill Waste After (in pounds)**	**Total Landfill Waste (in pounds)**		
9th – 12th	101.7	185.1	**83.4**		
			*Any waste amount measured before the lunch period includes the weight of the bin and breakfast or other items disposed before lunch hour.		

The staff at Boulder High was very busy and unable to give much feedback regarding food waste. Many time during service comments such as, “You have to take a fruit/vegetable” were heard. Students often respond that they will throw it away, but staff has no option to allow them to leave the lunch line without the items necessitated by NSLP. Some thoughts about why students do not want fruit or vegetables included that they are not taught at home to eat these items or their family cannot afford them. Fruits and vegetables are not cheap and if they only eat fast or processed foods, they will not suddenly want healthy food from school. To many students, eating healthy is not their social norm or expectation. One student recently asked a food service staff what a plum was! When asked about food waste values within the school and possibly reducing it, the answer was laughter with “good luck” from a member of the kitchen staff. Part of the problem the staff has is that they are unable to do any education or training with the students and cannot “police” what is happening in the cafeteria. No

school administrator has stepped up with the concept of having any type of monitoring done by either students or staff during lunch hours. This could be tricky anyways as students have access to the lunchroom bins at all times and no one could realistically monitor them the entire day. In regards to implementing composting at Boulder High, the feeling is that the students do not care enough and are at the age where it is all about the individual and what is happening in the moment.

Centaurus High School

Centaurus High School is not currently a Green Star School, but is scheduled to attain the distinction during the 2019-2020 school year. There are approximately 1,258 students, freshman to seniors, and around 24% of the population is on Free and Reduced Lunch. The cafeteria is located in the middle of the school, with no windows or direct access outside. Rectangular tables are set up for students to use during lunch or other periods. Students enter the lunch line from the cafeteria and proceed to take their entrée (offered in a boat), check out, then can take additional boats to have salad bar items, and finally use paper cups for milk and plastic silverware. A SHARE bin was above the silverware with a sign stating " Already Full? Return your whole, unused fruit here…", but it remained empty through the entire lunch hour. Centaurus High has an open campus for freshman through seniors, therefore, any student can leave during the lunch period to have lunch elsewhere or take the school lunch off campus. Trash and recycling bins are placed around the cafeteria, but with no set placement and often two recycling bins next to each other. A total of 3 trash bins (grey) and 5 recycling bins (yellow or green) were located in the main cafeteria area. No composting is done on campus yet, but will be implemented as the school looks to achieve Green Star status.

No other signs were located in the cafeteria referring to healthy food or food waste topics. Another point to note is that on Tuesdays, the BVSD Food Truck is at Centaurus.

The data was collected from Centaurus High School on Monday, October 16th, 2017. There are two lunch periods for all of the students from 11:18 – 12:10 PM and 12:15 – 1:05 PM. Students who have open or study periods are able to stay in the cafeteria during any time of the day. The lunch for the day included the options of a cheese pizza, pepperoni pizza, or a meatball sub sandwich (4 meatballs). On the salad bar, students had the choices of lettuce, cottage cheese, carrots (2 bins), mini bell peppers, tomatoes (2 bins), chickpeas, plain yogurt, and eggs. A pan of cut cantaloupe was placed before the salad bar, with a sign reminding students to only take two pieces so everyone would have a chance to get some. Again, students used boats for all food items.

While observing the bins during lunch, it was very apparent that the students did not know which bin to throw their waste in. Each bin, whether recycling or trash, had equal amounts of paper, plastic, boats, food, etc. Not a lot of actual food product was thrown out, as most high school students only took food that they wanted. Also, many students only had an entrée portion of the meal when leaving the lunch line.

The table below shows the amount of landfill and recycling waste collected during the hours of 10:30AM – 1:15PM. Like at Boulder High, this range is included and not specified as lunchtime because students came and went through the cafeteria, using the bins as needed. Furthermore, there are many students who take their lunch elsewhere during the lunch period and may utilize other bins to dispose of trash that

were not measured. A total of 3 landfill bins and 5 recycling bins were measured, although many students did not pay attention to what products went in any bin.

	Recycling Waste Before (in pounds)	Recycling Waste After (in pounds)	Total Recycling Waste (in pounds)	# of lunches sold	# of students present
9th – 12th	53	69.2	**16.2**	**165**	**1,112**
	Landfill Waste Before (in pounds)	**Landfill Waste After (in pounds)**	**Total Landfill Waste (in pounds)**		
9th – 12th	26.9	44.6	**17.7**		
			*Any waste amount measured before the lunch period includes the weight of the bin and breakfast or other items disposed before lunch hour.		

When the lunch periods began, students flocked to the cafeteria to socialize and some purchased lunches. Within the first 5-10 minutes, the crowd thinned out and most probably went elsewhere on campus or off. It was a beautiful day so students with cars could leave for lunch at local restaurants or younger students could walk across the street to Little Caesars, Silvermine Subs, or a taco shop (evidence of these foods were in the trash). During winter or snowy days, many more students will stay in for lunch and it is hard for kitchen staff to know when this may happen.

The KSL, Candy, does her best in estimating how many students will eat daily while doing ordering 3 weeks prior to the day. When completing daily counts, Candy will make a list of the number of meals prepared, added, and what was leftover in order to help calculate for the next time those meals are served. If there are products that can be saved and frozen, this helps reduce food waste and also prepare for days when more students stay for lunch. The kitchen also recently got the Lean Path system and

Claudio has seen the staff become much more aware of how much is being put in compost (even though the students do not compost, back of house does). Staff has reduced trimmings and waste, mostly because when disposing of the food, the scale keeps track of everything including the amount of money spent. The visual representation and monetary amount of what could be saved in a year creates a reason for staff to pay close attention to what is discarded. In addition, the salad bar items are carefully tracked so they can be used as long as possible without any cross-contamination.

Even though the staff is very busy during lunch service, they try to give visual cues to students about saving food for others and only taking what is necessary. They have noticed that athletes tend to take more food, perhaps for after school practice. It was more difficult to see what students ate as a lot of them leave the cafeteria, many bring food from home or elsewhere, and some do not eat at all. There were a large number of Little Caesars pizza boxes which was interesting considering it was pizza day at school also. As students disposed of their waste, they went to the closest bin and dumped everything at once, not taking care whether it should be thrown in the trash or recycled.

Comparison of Schools

Direct comparison of schools will not be done because there are too many factors that would affect the outcome. However, in order to see where each school is at as far as percentage of students eating school lunches and the waste produced by each school, graphs were created. Keep in mind that the waste produced does not take in to

account the number of students present, the high school students who left campus, or the fact that other waste bins might have been utilized. (See Appendix A)

Limitations

As with any study, limitations were present during data collection. In the high schools, the students have open campus and can come and go as they please. Even if a student purchased a school lunch, they may discard their waste outside of the lunchroom. In addition, there was no way to separate the waste from school lunch and lunch brought from home. Though the data is helpful to gain insight as to where is school is at with food waste, the question remains of where is most the waste coming from. When analyzing the data, an amount wasted per student who bought school lunch was not calculated because that would leave out all students who brought their own lunch. In observing students who brought lunch, many seemed to pack the food back in their lunchbox to bring home. This also would bias the results found.

With schools that do utilize compost, if the lunch was served in boats, the weight of those would be included in any final measurements. Again, the high schools only serve food in boats, so there is the added waste of 2-3 boats per student in the weight. When looking at the graphs, it is important to remember that each school has a different number of students enrolled and offer various means of waste disposal. Each school had a different combination of compost, liquid, landfill, and recycling bins.

The daily menu items also influenced whether students ate the school lunch or not. Some days, such as nacho or hamburger day, tend to be very popular with the students and a lot more will order school lunch and finish it. On other days, the

opposite is true and even if a lot of students are still getting a school lunch, a lot ends up wasted.

At Centaurus High School it was difficult to tell when looking in the bins whether it was supposed to be a recycling or landfill bin. This fact may skew the numbers from that school because each bin just had a conglomeration of everything. Likewise at Casey Middle School, even though there were places to compost, recycle, or throw out waste, the students mixed everything. The compost bin may not actually have been successfully used as composting since it was tainted with other items.

Recommendations for Next Steps

Now that baseline data has been collected, there are many recommendations for how BVSD should proceed in effort to reduce school food waste. The numbers are staggering when you think that in just one day, between only 6 schools in BVSD, over 413 pounds of food and waste was produced. That amounts to over 74,000 pounds throughout the school year at these 6 schools. Now imagine the total waste from just BVSD and then across all of the USA. Many of the following suggestions were compiled through the observations at each school and in talking to staff about current practices and ways they saw for improvement.

Green Star Schools

One of the biggest takeaways is that even though a school is certified as a Green Star School, they need constant **education** and reminders on what that means. The students should take pride in this distinction and understand what is required of them in order to maintain this certification.

Cafeteria Setup

Setup and flow of the cafeteria is vital to ensuring students will throw the appropriate waste in the correct bins. Looking at Columbine Elementary, they have the bins all in a row with an easy order to follow when disposing waste. Starting with the liquid disposal, then silverware, followed by the recycling, landfill, and finally compost bin before placing their tray at the cleaning window. Each bin is clearly labeled and the students have practiced exactly how to go through the line. Other schools that had bins placed randomly or unlabeled throughout the cafeteria suffered, as students would just go to the closest bin and throw everything in. When changing the setup, the lunch monitors will have to do constant practice with the students to ensure they learn the new procedure. As with anything, it will take practice, but in the long run, students will learn. Even with the ease of the layout, the students still need constant monitoring to remind them where to throw items. Having parent or staff volunteers to help during lunch hours would be an immense help.

Every cafeteria needs **signs** to show portion size, what items can be composted/recycled, why composting is important, food waste statistics and more. Involving students in the topic will create more buy-in from them and they often have creative ideas to get their peers included. At one school, there was a statistic about the amount of food waste per year and the kitchen staff said that if the students actually take time to read it, they are baffled by the information. Students also love to have their own posters displayed throughout schools so this gives them an opportunity to do so in the cafeteria.[5]

Looking at differences between Boulder High and Centaurus High, the newly **remodeled cafeteria** at Boulder seems to attract a lot more students to stay and enjoy

their lunch in the cafeteria. Contrasted with the old, dark cafeteria at Centaurus, where majority of students left the cafeteria as quickly as possible. This would demonstrate that the cafeteria environment and atmosphere goes a long way in creating a comfortable space for students to eat. It would be advisable to create a welcoming atmosphere in all cafeterias (especially the high schools since they can leave) so that students choose to stay and eat versus leave.

Most of the schools are supposed to be implementing the **SHARE table** – allowing students to place unused whole fruits in bins so that other students may take them. The SHARE bins were not visible at every school and if they were in place, students were unaware of its uses as many still threw away whole, uneaten fruits. Educating the students on what the SHARE bin is and how to use it needs to be done in each school. Having students create fancy signs to place around it with valuable information could also prompt more successful use.

Successful Serving

When it comes to the salad bars, the best way to encourage children to try new items would be **labeling each item**, perhaps with an intriguing title as suggested by the Smarter Lunchrooms Movement (SLM) for the younger grades. Names like 'Cauliflower Clouds', 'Celery Swords', 'Big Bad Bean Burrito', and 'Tasty Tree Tops' (Broccoli) are a few suggestions. An entire list of suggested names and descriptors are found on the SLM website.[5] Perhaps creating Velcro signs that can be easily applied and removed throughout the school year would be most effective. In addition, having taste tests for the salad bar items or giving students ways to incorporate the items into their meal might increase the students who try and consume new items from the salad bar.

Continued surveys asking students what they like and/or would like to see on the menu will also increase students who purchase and consume all of their school lunch.

The next suggestion has to do with school scheduling and that can be extremely tough to change. However, the National Education Association and others show that when **recess occurs before lunch**, the students consume more food, avoid stomach issues form eating and then playing, and have better behavior in the cafeteria post recess.[8] With recess first, the students get to socialize and move around after a morning of sitting in the classroom and working. They may work up an appetite and focus more on eating when they go to lunch versus socializing with friends. Furthermore, the amount of time that students have to eat is particularly short. When you take in to account the time it takes to get to the cafeteria, stand in line, then finally sit down to eat, the recess bell is already sounding. So many children then rush to get outside with a burger or other food item still in their hand. By combining both of these ideas, hopefully students would be more relaxed and take time to actually eat.

Education

Keeping parents informed is also of high priority. It does not matter whether their student eats school lunch or brings a lunch from home, but making weekly or monthly announcements in school newsletters regarding food waste is essential. For parents who pack a lunch, include recommendations on packing with Tupperware and reusable drink containers or buying in bulk to avoid excess plastic waste. If students eat at school, remind parents to discuss a variety of foods with their children and encourage them to only take food if they will eat it. Asking for parent volunteers to assist during lunchtime would be great to have monitors helping students when disposing their lunch waste.

This topic leads in to **education** on food waste. The staff, students, and parents, all need more of it. When discussing food waste, it must be put in simple terms so they can answer these questions: why should I care and how can I help? Explain how much money is wasted, how many hungry people there are right here in Colorado, how our natural resources are being wasted as well, and ways to avoid these problems. For students, take them on field trips to landfills or local farms to show where the food and waste ends up and how farmers could use the leftover scraps to feed their animals and land. Students especially need to see why reducing food waste should matter to them. Showing videos or having science projects about food waste would continue to expand their knowledge and interests. Ideas about healthy food and food waste can literally be incorporated into any lesson throughout the day, teachers just need to be excited about the topic as well and understand why it affects them. Holding staff trainings or in-service sessions regarding food waste would be a perfect way to involve everyone.

The USDA suggests each school could **create a club or group**, with student leaders, which would promote reducing food waste; they could plan activities and also be monitors in the lunchroom to help students discard waste appropriately.[4] The staff or student leaders can make morning announcements like Columbine Elementary School does, reminding everyone to separate their waste accordingly. Perhaps add a tip or quote about food waste to engage the students. Further, they can announce the school menu for the upcoming days and get students excited to try new items. Angevine Middle School could use Bobcat TV to do daily or weekly food waste announcements, as could any other school with access to a television.

Waste Diversion

Even though numerous schools in BVSD have composting available, creating this option at every school would be ideal. Since students are exposed to composting in their homes and business around Boulder County, many have already asked why they do not compost at school. A lot of training will need to happen when introducing composting, but in the long run, so much wasted food will end up in compost.

It will take time to set up composting, so meanwhile each school could try and partner with local companies to donate food scraps. Nederland Elementary School has a great system set up. Each day they collect all food scraps in a bucket to donate to a local farm (see Appendix E for image). If every school were able to do this, imagine how much food would be saved to help a good, local cause! Schools should investigate where they can donate their food scraps or possibly food can be donated to local shelters for those that are hungry.

Back of the House Ideas

In talking with many Kitchen Staff Leads, there are many ways staff is already incorporating a reduction of food waste in the kitchens. This needs to extend to all schools. The Lean Path system is a great tool to monitor exact numbers and cost of wasted food scraps and the kitchens that already have them have found it to be very successful. Other efficacious tips that have worked to reduce food waste include:

- Track meals purchased daily
- Pay close attention to how much food is ordered and do not be frivolous
- Follow a *First In, First Out* food rotation plan (based on expiration date)
- Reuse salad bar items and track how long they will remain fresh
- Repurpose leftover items to be used at a later date

- Only cook the amount of entrées that will be necessary – save the rest for another day
- Properly store food items in refrigerator or freezer in appropriate containers and temperatures

Conclusions

Over arching themes are more education, lots of re-teaching for the students and staff, and more help needed in the cafeterias to monitor students when disposing their waste. Constant reminders of why it is important to recycle or compost will influence students to follow the guidelines. Implementing composting at all schools would be a huge asset to decreasing food waste in the landfills. Many of the schools without compost mostly only produce compost waste, however it is all thrown in landfills. The process of starting composting at each school will take a lot of time, buy in from staff (especially the custodians), training, and monitoring of the students. If you start in the younger schools, the hope is that they will develop the knowledge and desire to want to reduce food waste and carry it on throughout their time in BVSD.

Due to the timing of the project, only one day of data collection at each individual school was available. It would be advised to continue weighing food waste at the same schools in order to see if any change occurs, especially if any change is implemented on the school to reduce food waste. The baseline data will give a start to determine what education and messaging needs to happen within the schools to effectively begin to reduce food waste.

References:

[1] The Economist Intelligence Unit. (2016). *Fixing Food Towards a More Sustainable Food System*. Parma. Retrieved from http://stage.barillacfn.gag.it/m/publications/bcfn-fixingfood.pdf

[2] Buzby, Jean C., Hodan F. Wells, and Jeffrey Hyman. The Estimated Amount, Value, and Calories of Postharvest Food Losses at the Retail and Consumer Levels in the United States, EIB-121, U.S. Department of Agriculture, Economic Research Service, February 2014.

[3] Environmental Protection Agency. *United States 2030 Food Loss And Waste Reduction Goal*.; 2015. Availble at: https://www.epa.gov/sustainable-management-food/united-states-2030-food-loss-and-waste-reduction-goal

[4] USDA | OCE | U.S. Food Waste Challenge | K-12 Schools. *Usdagov*. 2017. Available at: https://www.usda.gov/oce/foodwaste/resources/K12_schools.html. Accessed September 25, 2017.

[5] Smarter Lunchrooms Movement. *Smarterlunchroomsorg*. 2017. Available at: https://www.smarterlunchrooms.org/. Accessed September 25, 2017.

[6] Joining Vision and Action (JVA). *Reducing Food Waste In Denver Final Report And Recommendations*.; 2016. Available at: http://joiningvisionandaction.com/wp-content/uploads/2017/01/NRDC-Final-Report-071116.pdf. Accessed October 6, 2017.

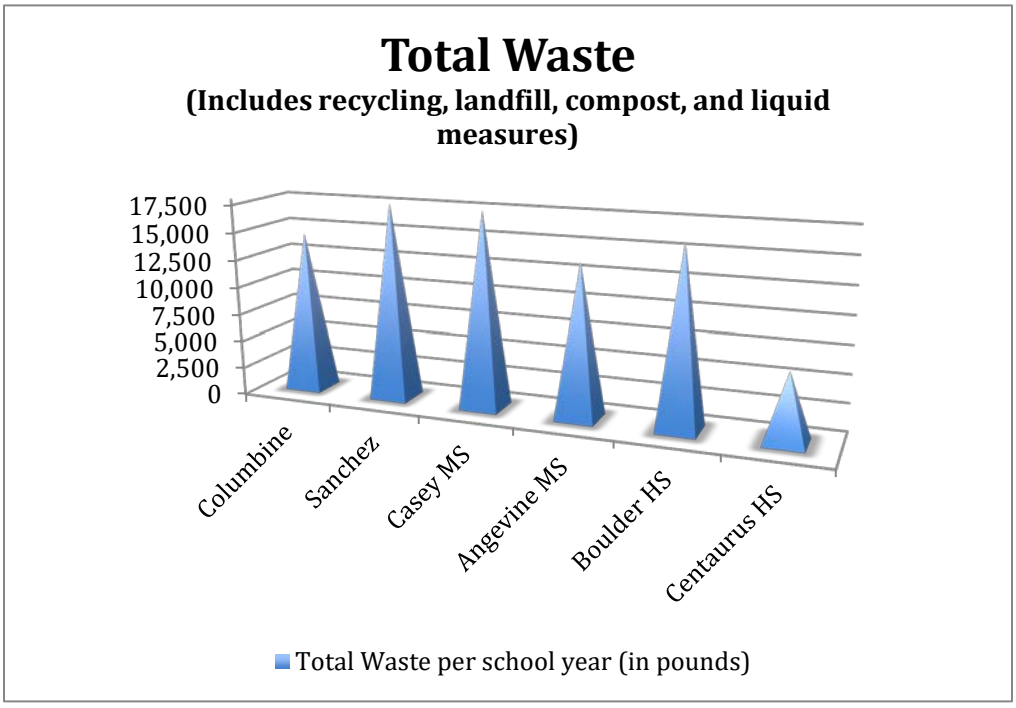
[7] Williamson, Ph.D., S. (2017). Why Reducing Food Waste in School Meal Programs Matters. *Extension*. Retrieved from http://articles.extension.org/pages/73963/why-reducing-food-waste-in-school-meal-programs-matters

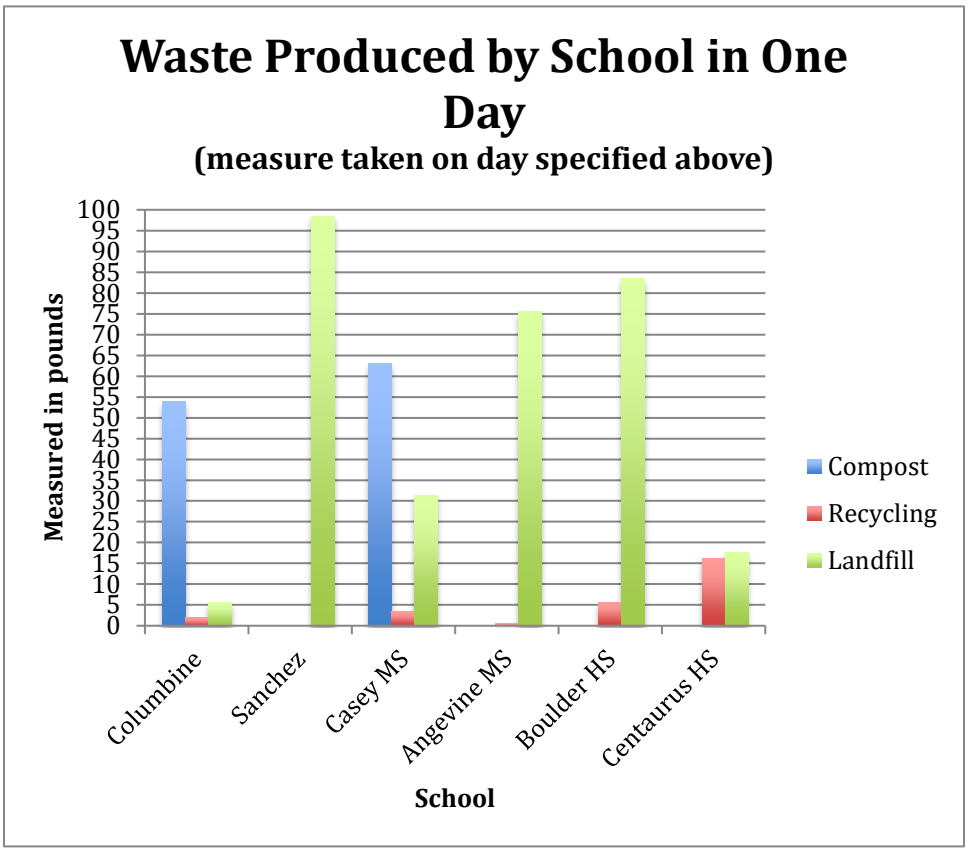
[8] Fuller, L. (2017). Recess Before Lunch. *NEA Today Magazine*. Retrieved from http://www.nea.org/home/43158.htm

[9] Wilking, J.D., C. (2017). *REDUCING FOOD WASTE IN OUT-OF-SCHOOL TIME: BEST PRACTICES GUIDE*. National Recreation and Park Association & Public Health Law Center at Mitchell Hamline School of Law. Retrieved from http://www.publichealthlawcenter.org/sites/default/files/resources/OST-Food-Waste-Best-Practices-Guide-2017.pdf

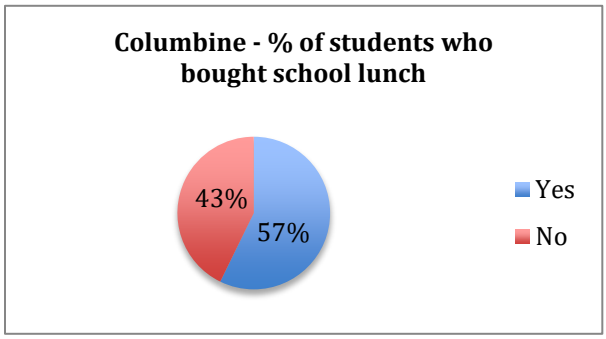
[10] *Eco-Cycle's Green Star Schools® program for Boulder County*. (2017). *Eco-Cycle*. Retrieved 4 October 2017, from http://www.ecocycle.org/schools/greenstarschools

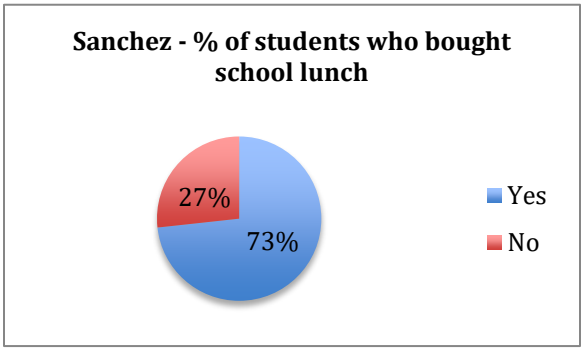
Appendix A: Waste Produced

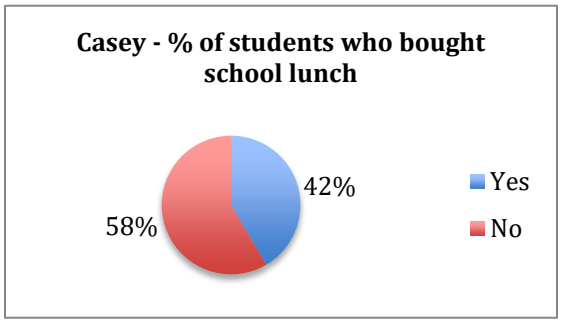


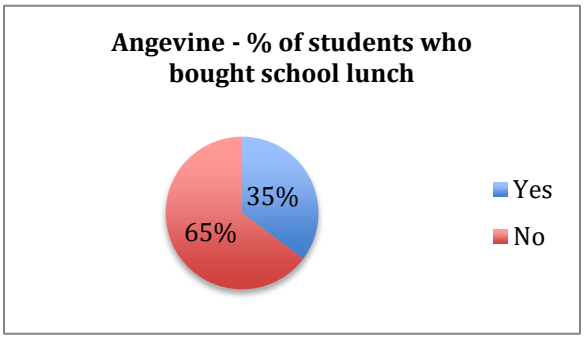


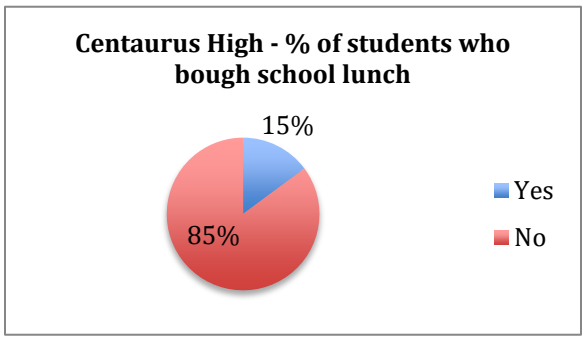
Appendix B: Percentage of students who bought school lunch

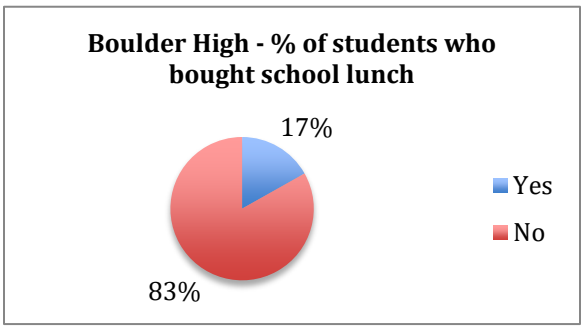












Appendix C: Attendance Records

17-18 **Columbine Elementary School** 3130 Repplier Drive, Boulder CO 80304 Generated on 10/16/2017 03:16:18 PM Page 1 of 1	**Attendance/Membership Summary Report** Start/End Date: 09/25/2017 - 09/25/2017 School(s): 1 Calendar(s): 1 Grade: PK, KG, 01, 02, 03, 04, 05

School: Columbine Elementary School Calendar: 17-18 Columbine Elementary

	Grade	Student Count	Membership Days	Absent Days	Present Days	ADM	ADA	Unexcused Absences Days	Unexcused Absences Avg. Daily	Percent In Attendance
	PK	52	52	0.00	52.00	52.00	52.00	0.00	0.00	100.00%
	KG	81	81	5.00	76.00	81.00	76.00	1.00	1.00	93.83%
	01	83	83	3.50	79.50	83.00	79.50	1.00	1.00	95.78%
	02	84	84	1.50	82.50	84.00	82.50	0.50	0.50	98.21%
	03	75	75	1.50	73.50	75.00	73.50	0.50	0.50	98.00%
	04	86	86	2.00	84.00	86.00	84.00	0.00	0.00	97.67%
	05	75	75	2.50	72.50	75.00	72.50	0.50	0.50	96.67%
Total	**7**	**536**	**536**	**16.00**	**520.00**	**536.00**	**520.00**	**3.50**	**3.50**	**97.01%**

17-18 **Alicia Sanchez Elementary School** 655 Sir Galahad Drive, Lafayette CO 80026 Generated on 10/16/2017 03:21:34 PM Page 1 of 1	**Attendance/Membership Summary Report** Start/End Date: 09/26/2017 - 09/26/2017 School(s): 1 Calendar(s): 1 Grade: PK, KG, 01, 02, 03, 04, 05

School: Alicia Sanchez Elementary School Calendar: 17-18 Alicia Sanchez

	Grade	Student Count	Membership Days	Absent Days	Present Days	ADM	ADA	Unexcused Absences Days	Unexcused Absences Avg. Daily	Percent In Attendance
	PK	49	49	1.50	47.50	49.00	47.50	1.00	1.00	96.94%
	KG	70	70	5.00	65.00	70.00	65.00	2.00	2.00	92.86%
	01	64	64	4.00	60.00	64.00	60.00	0.00	0.00	93.75%
	02	53	53	2.00	51.00	53.00	51.00	0.00	0.00	96.23%
	03	40	40	2.00	38.00	40.00	38.00	0.00	0.00	95.00%
	04	65	65	3.00	62.00	65.00	62.00	1.00	1.00	95.38%
	05	59	59	2.00	57.00	59.00	57.00	0.00	0.00	96.61%
Total	**7**	**400**	**400**	**19.50**	**380.50**	**400.00**	**380.50**	**4.00**	**4.00**	**95.12%**

17-18 **Casey Middle School** 1301 High Street, Boulder CO 80304 Generated on 10/16/2017 03:22:03 PM Page 1 of 1	**Attendance/Membership Summary Report** Start/End Date: 10/06/2017 - 10/06/2017 School(s): 1 Calendar(s): 1 Grade: 04H, 05H, 06, 07, 08

School: Casey Middle School Calendar: 17-18 Casey Middle School

	Grade	Student Count	Membership Days	Absent Days	Present Days	ADM	ADA	Unexcused Absences Days	Unexcused Absences Avg. Daily	Percent In Attendance
	04H	0	0	0.00	0.00	0.00	0.00	0.00	0.00	N/A
	05H	12	12	0.00	12.00	12.00	12.00	0.00	0.00	100.00%
	06	233	233	16.50	216.50	233.00	216.50	6.00	6.00	92.92%
	07	215	215	17.50	197.50	215.00	197.50	1.00	1.00	91.86%
	08	223	223	18.00	205.00	223.00	205.00	4.00	4.00	91.93%
Total	**5**	**683**	**683**	**52.00**	**631.00**	**683.00**	**631.00**	**11.00**	**11.00**	**92.39%**

17-18 **Angevine Middle School** 1150 South Boulder Road, Lafayette CO 80026 Generated on 10/16/2017 03:22:22 PM Page 1 of 1	**Attendance/Membership Summary Report** Start/End Date: 10/09/2017 - 10/09/2017 School(s): 1 Calendar(s): 1 Grade: 04H, 05H, 06, 07, 08

School: Angevine Middle School Calendar: 17-18 Angevine Middle School

	Grade	Student Count	Membership Days	Absent Days	Present Days	ADM	ADA	Unexcused Absences Days	Unexcused Absences Avg. Daily	Percent In Attendance
	04H	3	3	0.00	3.00	3.00	3.00	0.00	0.00	100.00%
	05H	32	32	0.00	32.00	32.00	32.00	0.00	0.00	100.00%
	06	225	225	6.50	218.50	225.00	218.50	1.00	1.00	97.11%
	07	208	208	16.00	192.00	208.00	192.00	7.00	7.00	92.31%
	08	237	237	14.50	222.50	237.00	222.50	1.50	1.50	93.88%
Total	**5**	**705**	**705**	**37.00**	**668.00**	**705.00**	**668.00**	**9.50**	**9.50**	**94.75%**

17-18 **Boulder High School** 1604 Arapahoe Ave, Boulder CO 80302 Generated on 10/16/2017 03:22:43 PM Page 1 of 1	**Attendance/Membership Summary Report** Start/End Date: 10/10/2017 - 10/10/2017 School(s): 1 Calendar(s): 1 Grade: 09, 10, 11, 12, 13, 06H, 07H, 08H

School: Boulder High School Calendar: 17-18 Boulder High School

	Grade	Student Count	Membership Days	Absent Days	Present Days	ADM	ADA	Unexcused Absences Days	Unexcused Absences Avg. Daily	Percent In Attendance
	09	565	565	24.00	541.00	565.00	541.00	4.00	4.00	95.75%
	10	530	530	29.50	500.50	530.00	500.50	8.50	8.50	94.43%
	11	488	488	28.00	460.00	488.00	460.00	13.00	13.00	94.26%
	12	489	489	30.50	458.50	489.00	458.50	13.00	13.00	93.76%
	13	0	0	0.00	0.00	0.00	0.00	0.00	0.00	N/A
	06H	0	0	0.00	0.00	0.00	0.00	0.00	0.00	N/A
	07H	2	2	0.00	2.00	2.00	2.00	0.00	0.00	100.00%
	08H	26	26	0.00	26.00	26.00	26.00	0.00	0.00	100.00%
Total	**8**	**2100**	**2100**	**112.00**	**1988.00**	**2100.00**	**1988.00**	**38.50**	**38.50**	**94.67%**

17-18 **Centaurus High School** 10300 S. Boulder Road, Lafayette CO 80026 Generated on 10/16/2017 03:23:08 PM Page 1 of 1	**Attendance/Membership Summary Report** Start/End Date: 10/16/2017 - 10/16/2017 School(s): 1 Calendar(s): 1 Grade: 09, 10, 11, 12, 07H, 08H

School: Centaurus High School Calendar: 17-18 Centaurus High School

	Grade	Student Count	Membership Days	Absent Days	Present Days	ADM	ADA	Unexcused Absences Days	Unexcused Absences Avg. Daily	Percent In Attendance
	09	365	365	28.00	337.00	365.00	337.00	9.50	9.50	92.33%
	10	337	337	32.00	305.00	337.00	305.00	16.00	16.00	90.50%
	11	259	259	32.50	226.50	259.00	226.50	21.00	21.00	87.45%
	12	275	276	33.00	243.00	276.00	243.00	19.00	19.00	88.04%
	07H	0	0	0.00	0.00	0.00	0.00	0.00	0.00	N/A
	08H	1	1	0.00	1.00	1.00	1.00	0.00	0.00	100.00%
Total	**6**	**1237**	**1238**	**125.50**	**1112.50**	**1238.00**	**1112.50**	**65.50**	**65.50**	**89.86%**

Appendix D: Meal Counts

Meal Counts

School: COLUMBINE ELEMENTARY
Start Date: 9/25/2017 **End Date:** 9/25/2017 **Serving Period:** Lunch
Terminal: All Terminals **Grade:** All Grades

	Full Pay	Reduced	Free	Reimbursable Total	Second Meals	Employee	Adult	Teacher	Total Meals
Totals:	72	22	175	269	0	6	3	0	278

Serve Date	School	Serving Period	Full Pay	Reduced	Free	Reimbursable Total	Second Meals	Employee	Adult	Teacher	Total Meals
09/25/2017	COLUMBINE ELEMENTARY	Lunch	72	22	175	269	0	6	3	0	278

Meal Counts

School: SANCHEZ ELEMENTARY
Start Date: 9/26/2017 **End Date:** 9/26/2017 **Serving Period:** Lunch
Terminal: All Terminals **Grade:** All Grades

	Full Pay	Reduced	Free	Reimbursable Total	Second Meals	Employee	Adult	Teacher	Total Meals
Totals:	48	27	169	244	0	11	4	1	260

Serve Date	School	Serving Period	Full Pay	Reduced	Free	Reimbursable Total	Second Meals	Employee	Adult	Teacher	Total Meals
09/26/2017	SANCHEZ ELEMENTARY	Lunch	48	27	169	244	0	11	4	1	260

Meal Counts

School: ANGEVINE MIDDLE SCHOOL
Start Date: 10/9/2017 **End Date:** 10/9/2017 **Serving Period:** Lunch
Terminal: All Terminals **Grade:** All Grades

	Full Pay	Reduced	Free	Reimbursable Total	Second Meals	Employee	Adult	Teacher	Total Meals
Totals:	89	14	120	223	0	5	4	0	232

Serve Date	School	Serving Period	Full Pay	Reduced	Free	Reimbursable Total	Second Meals	Employee	Adult	Teacher	Total Meals
10/09/2017	ANGEVINE MIDDLE SCHOOL	Lunch	89	14	120	223	0	5	4	0	232

Meal Counts

School: CASEY MIDDLE SCHOOL
Start Date: 10/6/2017 **End Date:** 10/6/2017 **Serving Period:** Lunch
Terminal: All Terminals **Grade:** All Grades

	Full Pay	Reduced	Free	Reimbursable Total	Second Meals	Employee	Adult	Teacher	Total Meals
Totals:	127	12	118	257	0	11	1	0	269

Serve Date	School	Serving Period	Full Pay	Reduced	Free	Reimbursable Total	Second Meals	Employee	Adult	Teacher	Total Meals
10/06/2017	CASEY MIDDLE SCHOOL	Lunch	127	12	118	257	0	11	1	0	269

Meal Counts

School: BOULDER HIGH SCHOOL
Start Date: 10/10/2017 **End Date:** 10/10/2017 **Serving Period:** Lunch
Terminal: All Terminals **Grade:** All Grades

	Full Pay	Reduced	Free	Reimbursable Total	Second Meals	Employee	Adult	Teacher	Total Meals
Totals:	186	22	122	330	0	6	7	0	343

Serve Date	School	Serving Period	Full Pay	Reduced	Free	Reimbursable Total	Second Meals	Employee	Adult	Teacher	Total Meals
10/10/2017	BOULDER HIGH SCHOOL	Lunch	186	22	122	330	0	6	7	0	343

Meal Counts

School: CENTAURUS HIGH SCHOOL
Start Date: 10/16/2017 **End Date:** 10/16/2017 **Serving Period:** Lunch
Terminal: All Terminals **Grade:** All Grades

	Full Pay	Reduced	Free	Reimbursable Total	Second Meals	Employee	Adult	Teacher	Total Meals
Totals:	95	18	52	165	0	0	1	0	166

Serve Date	School	Serving Period	Full Pay	Reduced	Free	Reimbursable Total	Second Meals	Employee	Adult	Teacher	Total Meals
10/16/2017	CENTAURUS HIGH SCHOOL	Lunch	95	18	52	165	0	0	1	0	166

Appendix E: Pictures from Schools

Columbine Pictures

Student Artwork displayed near disposal area

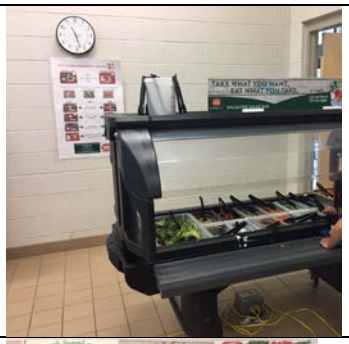
Landfill bin

Compost bin (early in lunch periods)

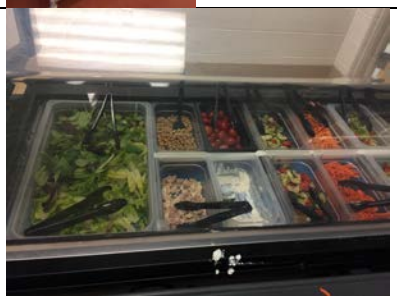
Notice the fork thrown in recycling bin!

Description of bins located above each

Milk station



Salad bar setup



More student artwork displayed in cafeteria

Some examples of food waste

<table>
<tr>
<td> 
Aquaponics System in school garden</td>
<td> 
School garden</td>
</tr>
<tr>
<td>  
Compost Bins</td>
<td> 
Recycling Bin</td>
</tr>
</table>

Sanchez Pictures

One of the few student artwork displayed

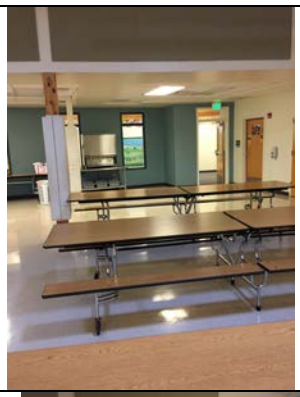
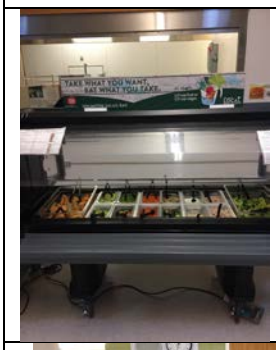


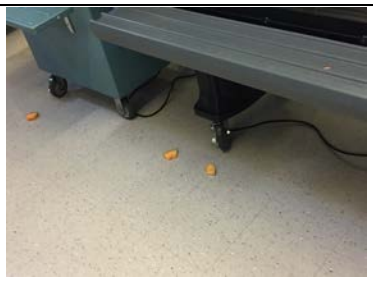
Table set up



Salad Bar

Lunch line flow

Disposal Set up – trash, recycling, silverware and cups



Wasted food on the floor

Tray set up with hot dogs or burritos

Casey Middle School Pictures

Lean Path System

Compost bin full of plastic!

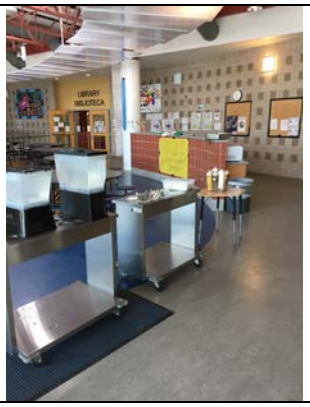
Trays at beginning of lunch line

Lunch line flow

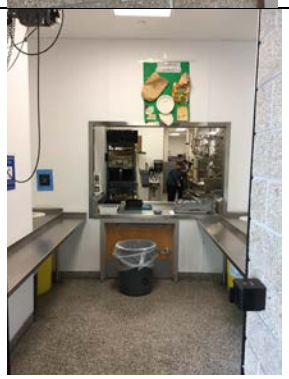
Salad Bar

Milk Station

Student artwork



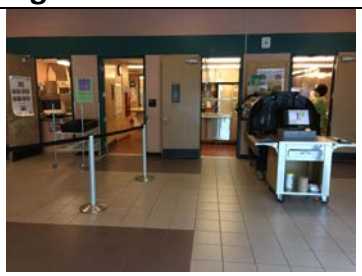
Water



Disposal area

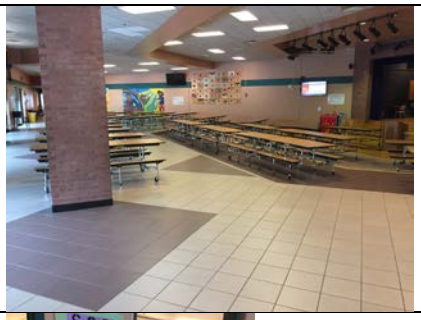
 Notice the small opening for recyclables	 Student reminders for waste disposal
The staff loses a lot of forks to landfill, recycling, and compost bins	 Compost bin with trash

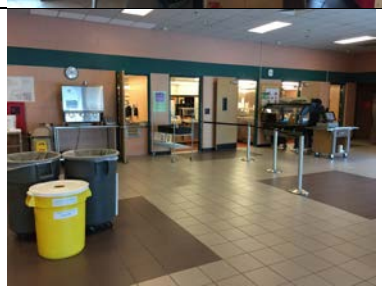
Angevine Middle School Pictures



Lunch line flows through the back room and to salad bar

SHARE table near water station





View of lunch line and disposal area

Loss of real silverware is a problem at Angevine also

Many students did not eat the buns

Landfill bins

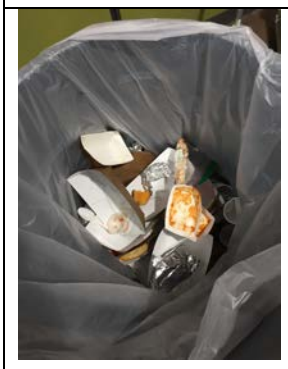
Boulder High Pictures

The only sign in the cafeteria

View of the new cafeteria layout – bins randomly placed around cafeteria

Salad bar setup

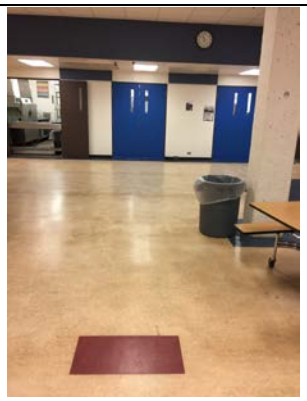
Lunch line flow



Trash bins full of recycling materials and compostable boats (not much food)

Centaurus High Pictures

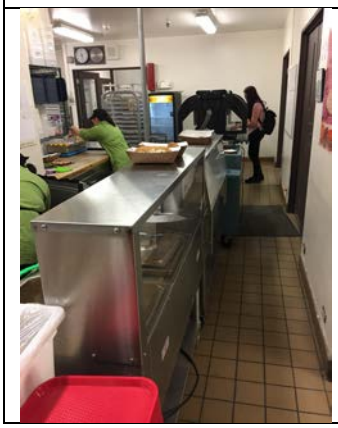
Two recycling bins and tables



Cafeteria layout

Food Truck every Tuesday – students leave cafeteria

Notice all the plastic silverware and SHARE table sign (empty)

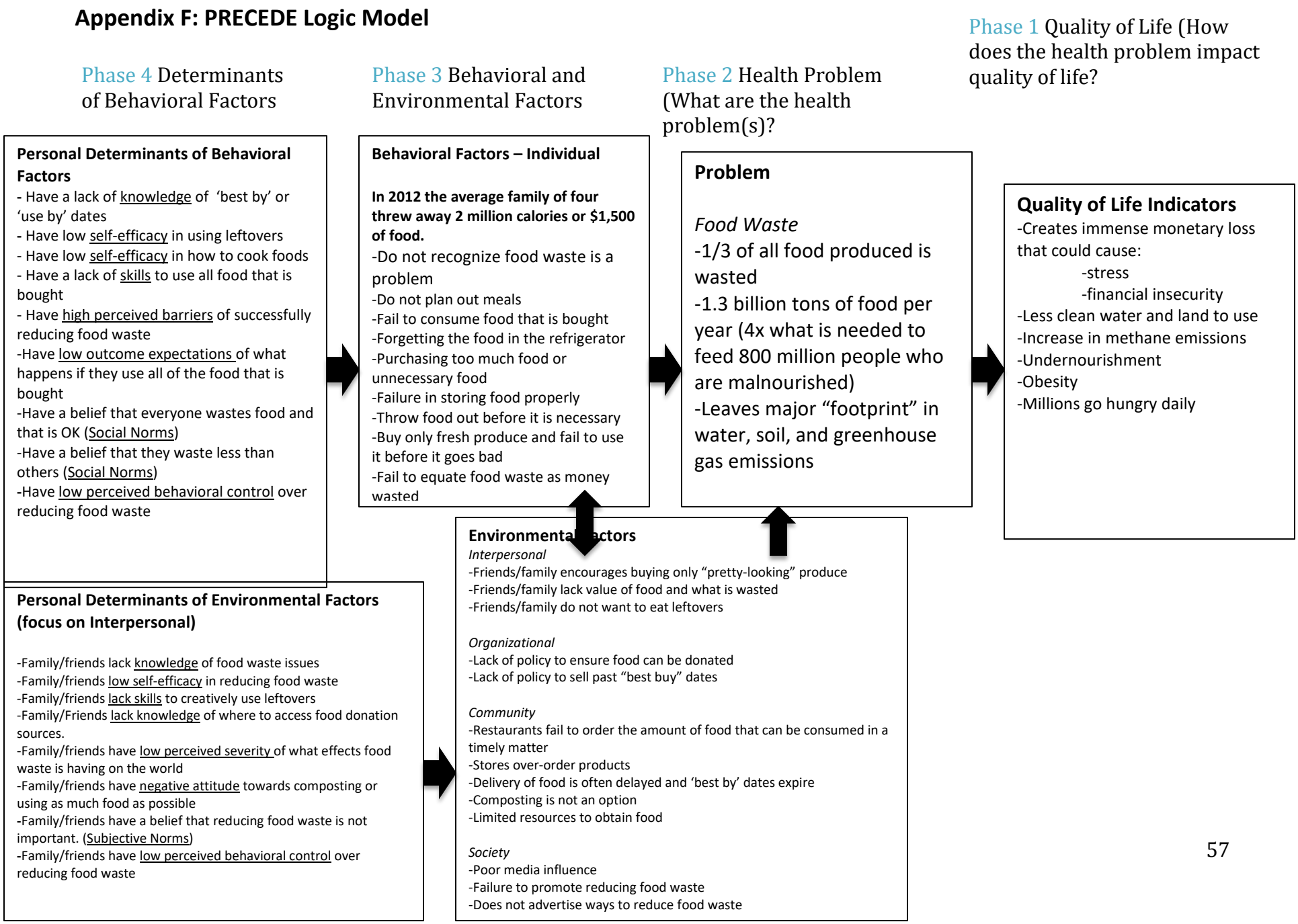


Tight line with salad bar at the end

	Kitchen staff trying to reduce food waste		Meal options – both served in boats
	Evidence that lots of students leave for lunch – not sure if this is a recycle or trash bin		Again, confusion on what bin this is for the students

*Nederland Elementary School's compost bucket for local farmer

Appendix F: PRECEDE Logic Model



Appendix G: Food Waste At a Glance[9]

WHAT YOU CAN DO ABOUT OST FOOD WASTE AT-A-GLANCE

WEIGH IT!

Have kids separate food waste from other waste during meals and snacks and measure the amount of food waste they make. Share the results and brainstorm causes and ways to cut down on wasted food.

TASTE IT!

Have kids taste test new menu items, fill out a survey, or participate in a focus group about which foods they like to eat, and why. Share the findings with whoever produces food for your program, and then try to make changes based on the feedback.

EAT IT!

Kids eat and drink more if they play outside or do other physical activity before meals and snacks, so try scheduling active play before meals and snacks. Let kids keep a whole fruit, vegetable, or grain from their meal to eat later on.

SHARE IT!

Set up a share table where kids can put whole items from their meals to share with other children in their program who may want an additional serving.

DONATE IT!

Work with a local non-profit organization to collect uneaten food for donation. Have kids help collect food and invite the organization to come visit your program and share what they do.

COMPOST IT!

Teach kids what compost is, what is compostable, and why it is so important for the soil and food production. Have kids create signs and have them help run your composting system.

RECYCLE IT!

Teach kids which food packaging and food service items are recyclable, and why keeping recyclables out of the trash is important for the environment. Have kids create signs and have them help run your recycling program.

WEIGH IT AGAIN!

Have kids do a follow-up food waste measurement so they can see their success.