

UBC OKANAGAN WASTE AUDIT

Waste audit report: November 23, 2018

Waste audit date: October 4, 2018

Prepared For: Facilities Management and UBC Okanagan Sustainability Office



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EXECUTIVE SUMMARY

On October 4th, 2018, UBC Okanagan and GreenStep Solutions Inc. partnered to facilitate a waste audit. Four different waste streams (garbage, recycling, returnable, and compost) were assessed from 12 different buildings/areas on campus. The 2018 waste audit was the fifth audit that GreenStep has facilitated with UBCO since 2010 and the garbage audit remains the primary focus.

The audit was set up at UBC Okanagan's courtyard at 8:00 am and was facilitated by Andrea Mackintosh and Wendy Wright from GreenStep Solutions and Derek Mahoney from UBC Okanagan.

Tarps were set out in the courtyard with strings designating rows for collected waste to be placed for the audit. Bags of garbage, recycling, and returnables were placed on the tarps in front of the appropriate signs, which identified the building from which the bags came. Compost was placed together on a separate tarp and bags were labeled with the origin building. The GreenStep team, members from UBC Okanagan staff, and student volunteers from the SUST 100 class dressed in protective clothing and sorted the waste for eight hours.

A total of 5,211 litres of garbage, 3,887 litres of recycling, 523 litres of returnables, and 40 litres of compost was audited, totaling 9,661 litres of waste audited.

The garbage audit findings demonstrated that only 19% of the total sample volume was 'true' garbage, meaning that 81% of the waste had the potential of being diverted from the landfill.

The recycling audit found 75% of the total volume to be 'true' recycling, with 25% contamination in the recycling stream.

The returnable audit found 83% of the total volume to be 'true' returnable waste, with 17% contamination in this stream.

The compost audit found 100% of the total volume to be 'true' compostable waste, with 0% contamination in this stream.

Figure 1. Garbage audit - Percent of total volume of waste sample by type (simplified categories).
UBCO waste audit, October 4, 2018.

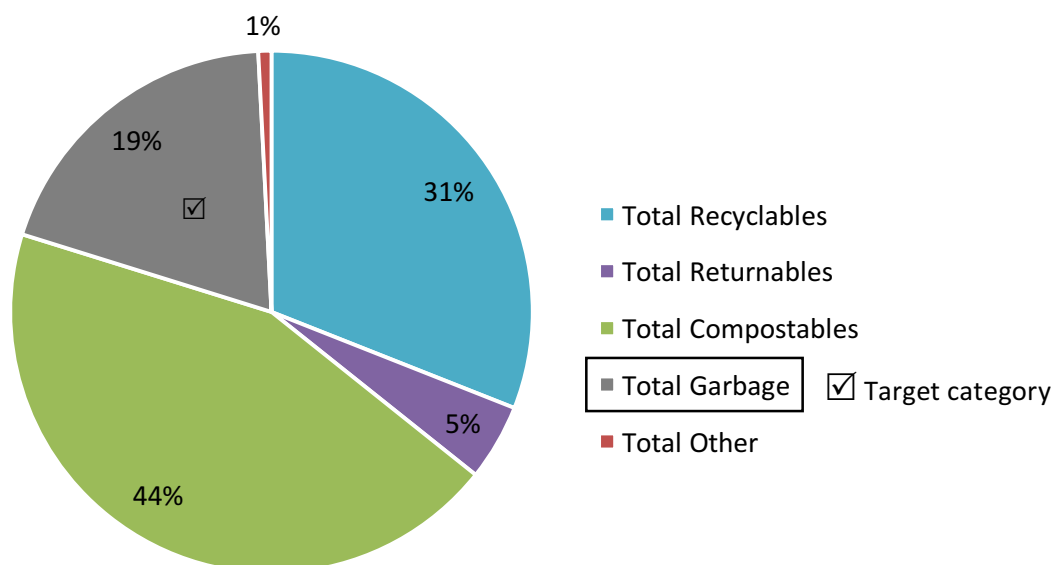
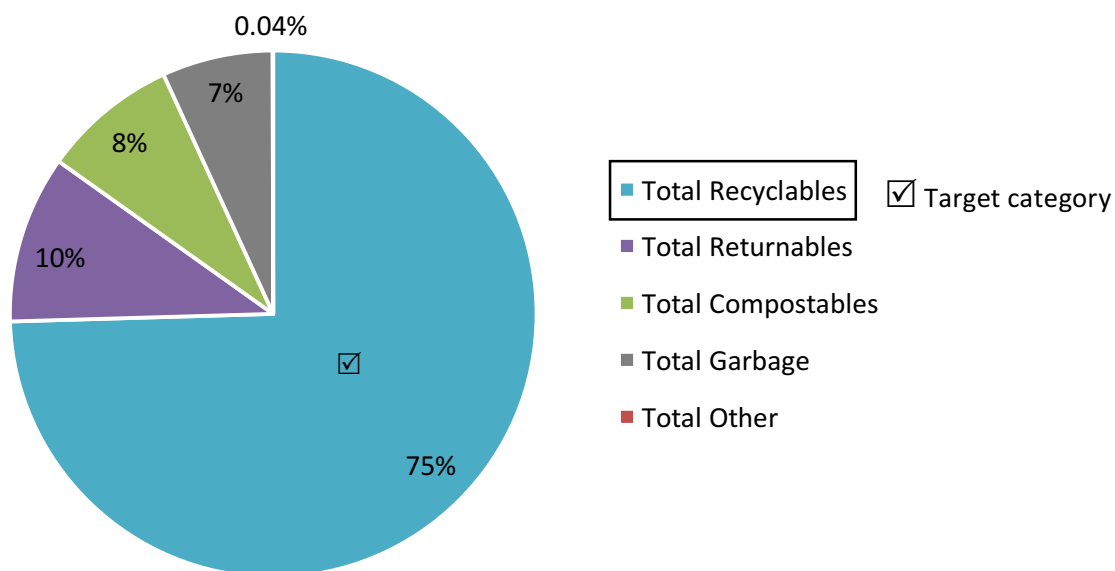
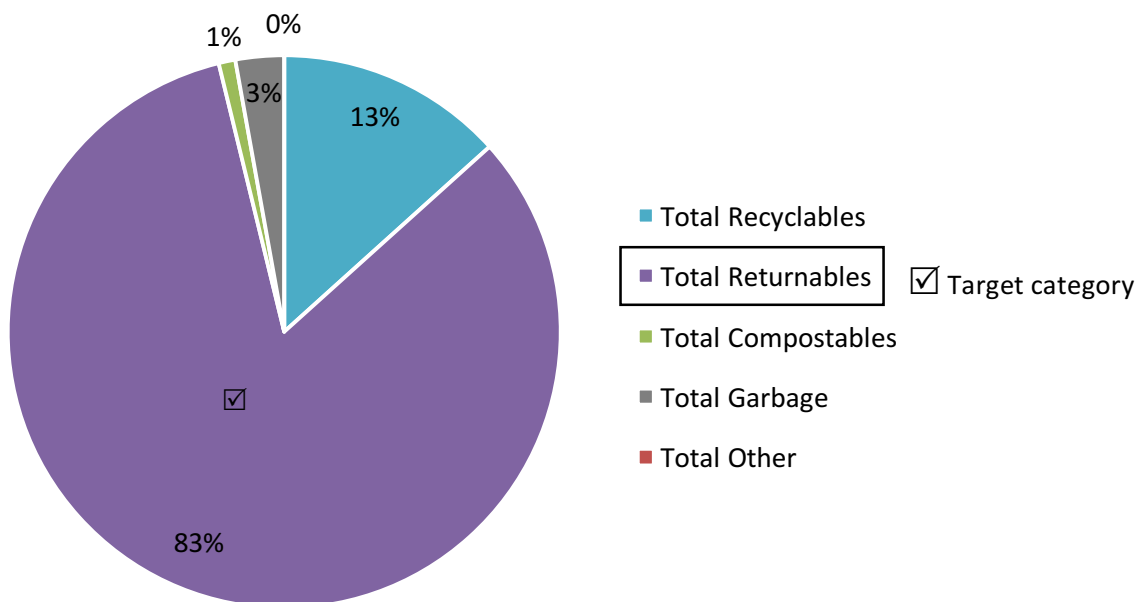


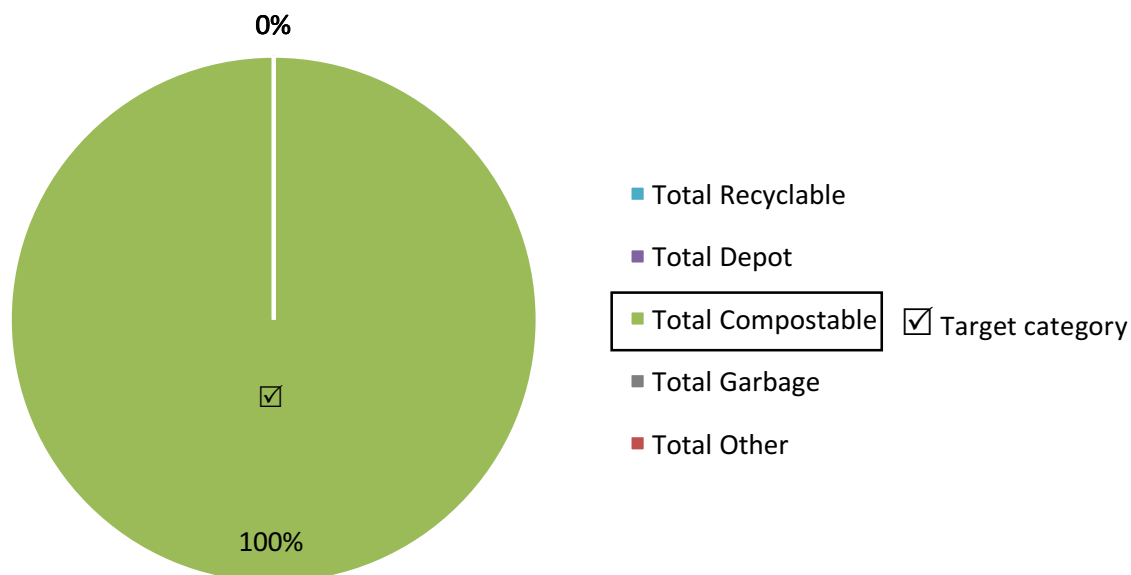
Figure 2. Recycling audit - Percent of total volume of waste sample by type (simplified categories).
UBCO waste audit, October 4, 2018.



**Figure 3. Returnable audit - Percent of total volume of waste sample by type (simplified categories).
UBCO waste audit, October 4, 2018.**



**Figure 4. Compost audit - Percent of total volume of waste sample by type (simplified categories).
UBCO waste audit, October 4, 2018.**



Key Recommendations include:

REDUCING AND REUSING

- *Convert more bathrooms to have high-efficiency hand dryers instead of paper towels. Target busiest buildings first (Library, UNC, EME). For very busy buildings, consider the in-sink style dryers to reduce line-ups for 1 or 2 wall-mounted hand dryers.

RECYCLING

- *Consider an advertising campaign *on* paper coffee cups/sleeves where possible (i.e. the cafeteria, or other food outlets that you have any control over). Design and order cups and/or sleeves that prominently say something like “recycle me” with the recycling symbol, and colours that match your recycling bins (blue).

COMPOSTING

- *The compost sample that was collected for the audit was not contaminated (although it did contain 10% paper towel and bio-containers, which are technically not accepted in the compost program), but a lot of composting potential is being missing from the rest of campus. In the one day sample, 162 litres of food waste was found in other waste streams (mostly the garbage, at 148 L) compared to the 36 L of food waste found in the compost audit. To enhance waste reduction at UBCO, work on capturing this potential. Add compost bins in more areas; try one per floor, instead of one per building. Target busiest buildings first: Science building and Arts building had the most food waste in the garbage, followed by UNC and EME.

SIGNAGE, EDUCATION, AND COMMUNICATION

- *Train and deploy a Green Police team on campus to guide students on how to divert waste. The task of a Green Police is to monitor a waste station and guide users on how to dispose of their waste items correctly. They also correct mistakes during busy periods to ensure proper waste diversion occurs. Target September when there are lots of new students on campus. Target bins in each building (to interact with as many students as possible). Ideas on who to get involved: Student volunteers, Environmental sciences or sustainability classes, Environment club (ESS). This would make a big impact on student education; it's *live* education, not reading something that's easy to ignore.
- *Revisit/review how sustainability (including waste diversion) is introduced to new students, i.e. when registering, during orientation, etc. Getting a page into the orientation handbook is a good start but it will likely be ignored or missed by most students. Find a better way to highlight UBCO's commitment to sustainability and make it fun an interactive if possible. Perhaps introduce a recycling quiz or sorting game. Orientation events for new students are a good opportunity for mentioning sustainability on campus, including a section about waste diversion.

INFRASTRUCTURE

- *The biggest problem area on campus is the library. When compared to other buildings, its garbage stream has the most recycling, most returnables, third most 'other' items, and second least 'true garbage'. Assess and scale up all waste diversion tactics in the library; bin placement, signage, and messaging/communications.

RESIDENCES

- *The two biggest contaminants in the sample of residence garbage were plastic containers and food waste. Make a concerted effort to include an entire residence building in the next audit or do a full-scale residence audit on an alternating (odd) year. Aim for residence audit in fall 2019.

INTRODUCTION

On September 20, 2018, Andrea Mackintosh from GreenStep Solutions met with staff at UBCO including Derek Mahoney (Manager, Landscape and Contract Services), Stephanie French (Advisor, Sustainability), Roger Bizzotto (Associate Director, Facilities Management), Mike (Best Service Pros), and Bonnie and Scott (Pathways Abilities Society) to plan and coordinate the 6th biennial UBCO waste audit to take place in early October 2018. A date of October 4th, 2018 was set to audit one day's worth of waste from 12 different buildings/areas on campus:

- Administration
- Arts
- Arts & Sciences Centre (ASC)
- Creative & Critical Studies (CCS)
- Engineering, Management & Education (EME)
- Fipke Centre
- Gymnasium
- Library
- Reichwald Health Sciences Centre (RHSC)
- Purcell residences (*Sample)
- Science
- University Centre (UNC)

On the day of the audit, approximately 47 people participated throughout the course of the day, including two UBCO staff (Derek Mahoney and Roger Bizzotto), one faculty member (Dr. Matthew Nelson), three GreenStep staff, 40 students from the SUST 100 class, and one other student. The majority of volunteer recruitment was generated by Dr. Matthew Nelson, professor of the SUST 100 class. This year he included the waste audit into his syllabus and made it a class assignment to participate in the waste audit. The cafeteria provided refreshments for volunteers. Stephanie French set up an educational display in the courtyard beside the audit and spoke to people passing by about what was going on, and encouraged people fill out “pledges” to reduce their carbon footprint.

Andrea Mackintosh, Wendy Wright, and Maria Marsh facilitated the event by helping to set up, greeting the volunteers, facilitating a safety orientation, explaining the waste audit categories and procedure, answering questions throughout the audit process, collecting the data, and helping to clean up after the audit was finished.

The objectives of the waste audit were to:

- Record the type, volume, and composition of waste generated at UBC Okanagan and break it down by source
- Raise awareness about waste reduction on campus and get students involved
- Identify buildings to target with additional education
- Compare to past and future audits
- Make recommendations for improved waste management opportunities.

UBC OKANAGAN WASTE REDUCTION PRACTICES

UBC Okanagan has implemented several waste reduction practices over the years, some from the recommendations of the waste audits conducted by GreenStep in the past. Most recently, UBC Okanagan has completed the following initiatives:

- Developed new signage for waste stations. “Sort it out” three options in most places, bigger 5-option station on main floors (see image below)
- Designed and installed a new large centralized waste station in the cafeteria. Modelled after UBC Vancouver, but with signage specific to UBCO. All old waste stations have been removed.
- Added waste carousels to prevent bins being moved, especially bins going back into classrooms. They are currently located in Art building and Science building only. They need about 100-125 more to do entire campus. Targeting public/student areas.
- Created a waste removal flow chart, including all 17 unique waste streams. It can be downloaded from facilities website.
- Started recycling cigarette butts through Terracycle.
- Added new signage on the paper towel dispensers (“it only takes one...”) to reduce usage.
- Installed Airstream hand dryers in the new Commons building, with no paper towel option.



METHODOLOGY

Just as it has been done in past years, quantities of waste were estimated using volume rather than weight for two reasons: 1) Waste is picked up and disposed of based on how full the bins are, not by weight. 2) Items like paper, plastic film, and Styrofoam weigh significantly less than other items such as food waste and are underrepresented when measured by weight.

One day's worth of waste was collected from all areas of all buildings on campus, with the following inclusions and exclusions:

- The outdoor courtyard area was excluded
- The garbage audit included the garbage bins from the bathrooms, which contain mostly paper towel (*these were not included in 2016). This makes a big difference in the garbage audit results because paper towels make up a large proportion of the overall garbage stream at UBCO; in 2014 they were 29%, and in 2018 they were 34%, whereas in 2016 when bathrooms were excluded, they were only 8%. Omitting bathroom waste in 2016 skewed the percentages of all other waste categories, therefore the 2018 results are more comparable to the 2014 audit.
- The garbage audit excluded *in-stall* bathroom waste
- The compost collected from around the campus excluded the cafeteria kitchen compost. Because volumes were so low, the auditing process combined all samples and did not keep the samples separated by building.
- There was no recycling collected from the RHSC building.
- There was no separated returnable sample collected from the Gym, Library, Purcell, RHSC, Science, or UNC. These were either not collected, or they accidentally got mixed up with the recycling samples.

It is important to note that some sorting practice differences emerge between volunteer groups during the sorting process. For example, some volunteers sorted soiled items such as paper or disposable coffee cups into the garbage while others sorted them into the compost. The sorting process is never perfect. However, the auditing process is consistent and reduces most sorting discrepancies.

Clear bags used for sorting during the audit were supplied by UBCO. This year GreenStep used a volume estimation method that was introduced in 2016, making the results directly comparable to 2016. The new method provides increased accuracy and will continue to be the method used going forward. Rather than using the volume of the large clear bag to estimate the waste volume in each bag, the sorted bags of waste were placed in one of four smaller bins of known volume in order to make the estimation. The three bins used were a 76.7 L blue recycling bin, a 60.6 L blue recycling bin, a 19 L bucket, and a 11.4 L pail.

After the audit was complete, the sorted bags were taken away by custodian staff and diverted appropriately according to their discretion, i.e. recycled, composted, returned for refund, or sent to the landfill.

Volunteers wore protective coveralls, shoe covers, and nitrile gloves. The use of safety glasses and tongs was optional.

All waste was physically sorted into the following five categories with 17 sub-categories:

- Recycling
 - Plastic containers
 - Paper products
 - Cardboard & boxboard
 - Tin & aluminum
 - Paper coffee cups
 - Other comingled recycling
- Returnable
 - Refundable cans & bottles
 - Glass jars & bottles
 - Plastic bags & overwrap
 - Styrofoam
- Compost
 - Organics (food & yard waste)
 - Paper towel & napkins
 - Bio-containers & utensils
- Garbage
 - Garbage
 - Garbage bags
- Other
 - E-waste
 - Reusable items

One category changed slightly since the 2016 audit; paper coffee cups were removed from the “paper products” category and given their own category in order to isolate them and better understand this waste category.

The sorting categories and audit process did not take into account Recycle BC’s new “other flexible packaging” pilot program that began on June 1, 2018. The items included in the pilot program (such as snack wrappers, chip bags, zipper lock bags, etc.), which can be returned to Columbia Bottle Depots, were counted as “garbage” in this audit.

The percentage of waste identified within each category is represented in Figure 1. Note that sub-categories within each of the five main waste categories (recycling, returnable, compost, garbage, and other) are shown in different shades of the same colours (i.e. all recycling items are in different shades of blue)

Figure 1. Garbage audit - Percent of total volume of waste by type for all buildings/areas on campus (UBCO waste audit, October 4, 2018).

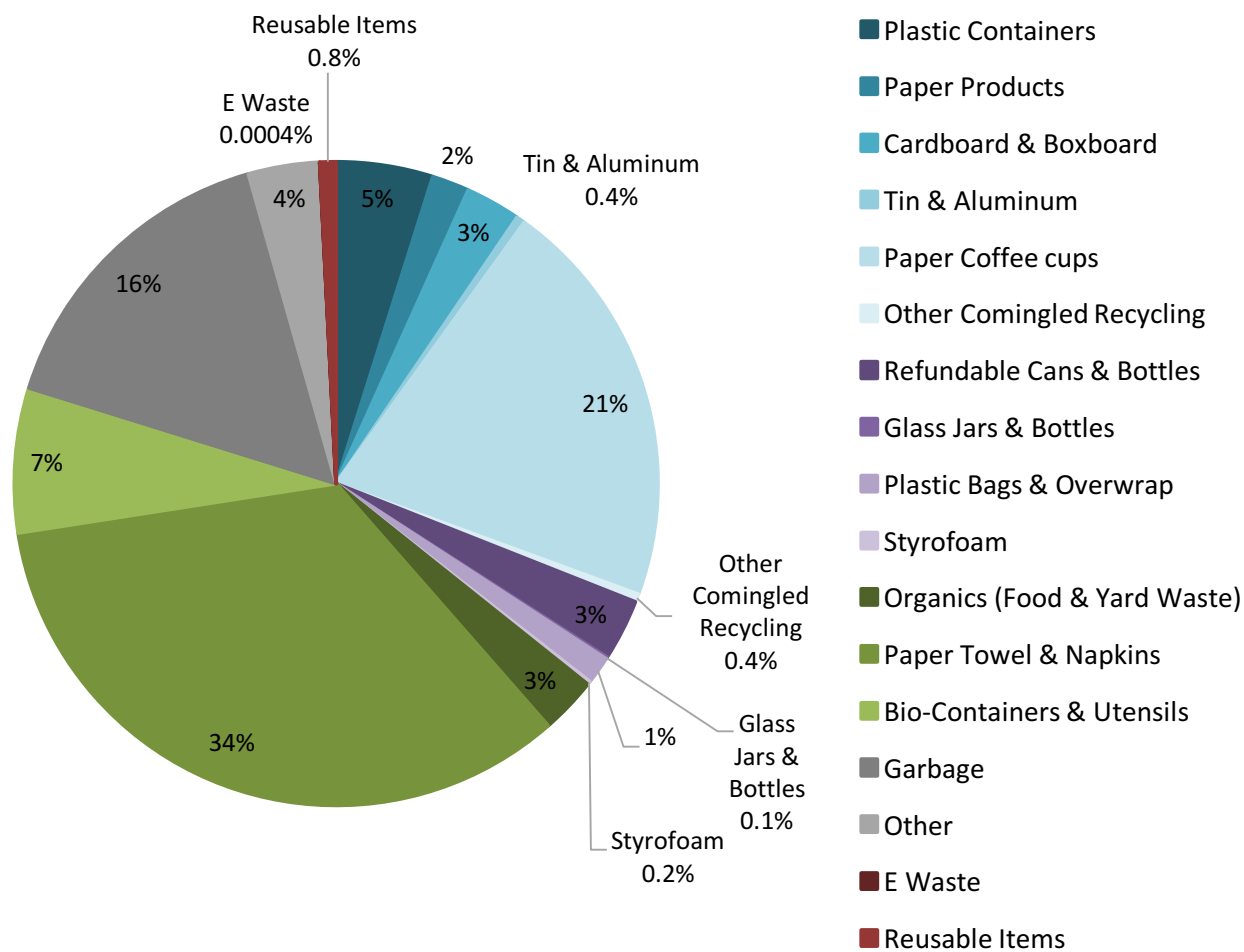


Figure 2 and Table 2 below show the volume of waste collected from each building. The areas that produced the largest quantities of waste were the UNC, Library, and Arts buildings.

Figure 2. Garbage Audit - Percent of total volume of waste by source (UBCO waste audit, October 4, 2018).

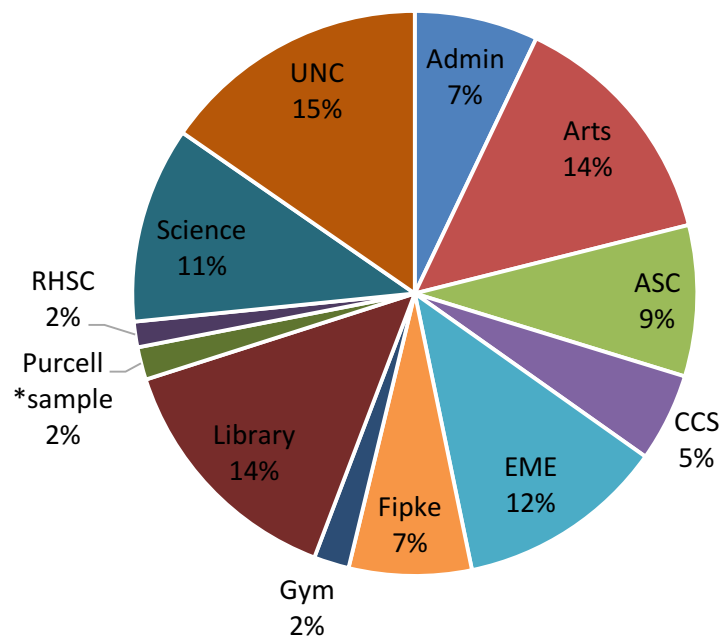


Table 2. Garbage Audit – Percent of total volume of waste by source, in descending order (UBCO waste audit, October 4, 2018).

Building source	Percent of total campus waste
UNC	15%
Library	14%
Arts	14%
EME	12%
Science	11%
ASC	9%
Admin	7%
Fipke	7%
CCS	5%
Gym	2%
RHSC	1%
Purcell *sample	2%*

RECYCLING AUDIT

The results of the recycling audit indicate that of the 3,887 L of waste audited, 75% was recyclable, 10% was returnable, 8% was compost, 7% was garbage, and less than 1% was “other” (e-waste and reusable items). Specific details and breakdown on the volumes of waste can be found in the tables and figures below.

Table 3 shows the complete breakdown of the recycling audit, including the volume of waste from each building and in each waste category, the percentages of each category, and totals in litres and percent.

*Note: semi-total rows occur within the table in darker colours

Table 3. Recycling Audit - Volume of waste (in Litres and %) measured by type of waste for each building/area on campus (UBCO Waste Audit, October 4, 2018).

Type of Waste	Origin of Waste																							
	Admin		Arts		ASC		CCS		EME		Fipke		Gym		Library		Purcell *Sample		Science		UNC		Total	
	%	L	%	L	%	L	%	L	%	L	%	L	%	L	%	L	%	L	%	L	%	L	%	L
Plastic Containers	10	23	6	30	7	30	3	14	9	66	6	20	4	2	6	12	7	8	11	33	6	29	7	267
Paper Products	7	15	5	25	12	49	17	75	3	24	18	56	2	1	3	6	4	5	4	13	8	44	8	311
Cardboard & Boxboard	7	15	5	29	13	52	57	244	14	108	9	29	15	8	5	11	49	56	31	90	27	141	20	783
Tin & Aluminum	0	0	0	0	0	0	0	0	0	0	4	13	0	0	0	0	0	0	0	0	0	2	0	14
Paper Coffee cups	39	92	70	384	41	167	6	25	43	333	39	120	59	0	45	89	3	4	38	110	24	125	38	1,478
Other Comingled Recycling	3	8	0	0	2	8	0	0	2	13	0	0	4	2	0	0	3	4	0	0	2	9	1	44
Total Recyclables	65	153	86	468	74	306	83	357	71	543	76	237	84	42	59	118	66	76	84	246	66	350	75	2897
Refundable Cans & Bottles	11	26	0	0	14	58	11	48	9	70	5	17	11	6	20	39	16	18	10	30	11	58	10	370
Glass Jars & Bottles	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	2
Plastic Bags & Overwrap	1	1	0	0	1	4	0	0	2	12	1	2	0	0	0	0	0	0	0	0	0	0	0.5	20
Styrofoam	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	2	7	0	0	0.2	8
Total Returnables	12	27	0	0	16	64	11	48	11	83	6	20	11	6	20	39	16	18	13	37	11	58	10	400
Organics (Food & Yard Waste)	1	2	0	3	0	0	0	0	0	2	0	1	0	0	1	1	0	0	0	0	1	4	0.3	13
Paper Towel & Napkins	1	3	0	3	2	7	0	0	0	3	0	1	0	0	1	3	0	0	0	0	1	4	0.6	25
Bio-Containers & Utensils	11	26	9	48	3	12	1	6	7	55	5	16	2	1	12	23	14	16	0	1	15	82	7	286
Total Compostables	13	30	10	54	5	20	1	6	8	60	6	18	2	1	14	27	14	16	0	1	17	90	8	324
Garbage	10	23	4	23	5	21	4	18	11	81	6	17	2	1	8	15	4	5	3	9	6	32	6	245
Other	0	0	0	0	0	0	0	0	0	0	6	19	0	0	0	0	0	0	0	0	0	0	0.5	19
Total Garbage	10	23	4	23	5	21	4	18	11	81	12	36	2	1	8	15	4	5	3	9	6	32	7	264
E Waste	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.001	0.03
Reusable Items	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0.03	1
Total Other	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0.04	1
Total Waste Volume	6.0%	234	14.0%	545	10.6%	411	11.1%	430	19.7%	768	8.0%	311	1.3%	50	5.1%	200	3.0%	115	7.6%	294	13.6%	529	100%	3,887

The percentage of waste identified within each category is represented in Figure 3. Note that sub-categories within each of the five main waste categories (recycling, returnable, compost, garbage, and other) are shown in different shades of the same colours (i.e. all recycling items are in different shades of blue)

Figure 3. Recycling audit - Percent of total volume of waste by type for all buildings/areas on campus (UBCO waste audit, October 4, 2018).

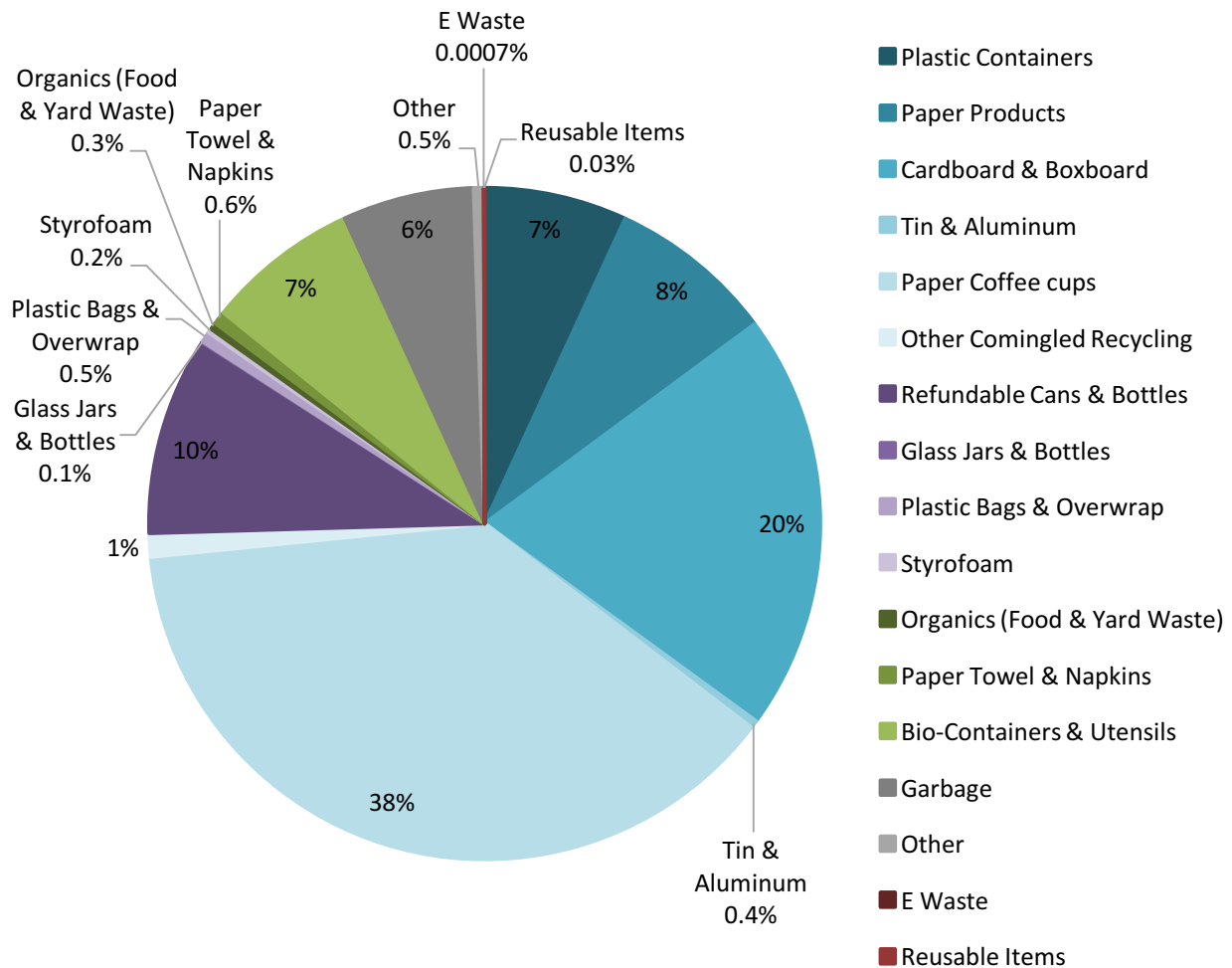


Figure 4 and Table 4 below show the volume of waste collected from each building. The areas that produced the largest quantities of recycling were the EME, Arts, and UNC buildings.

Figure 4. Recycling Audit - Percent of total volume of waste by source (UBCO waste audit, October 4, 2018).

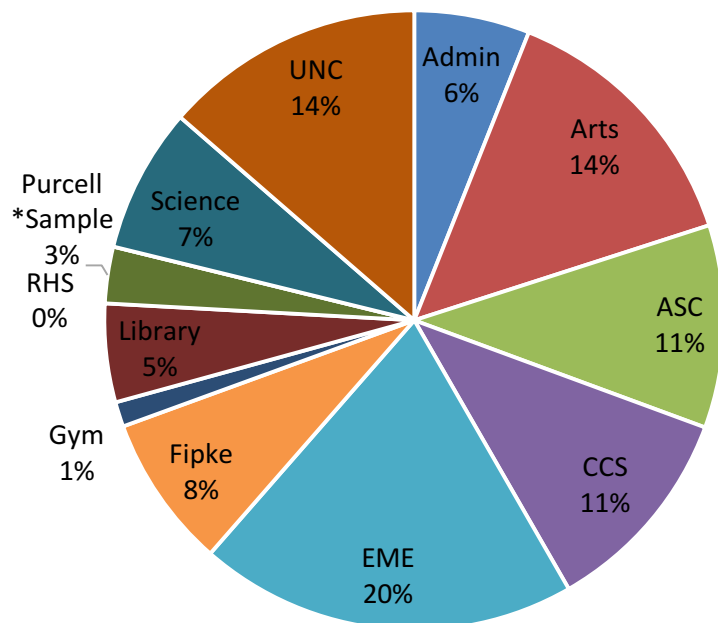


Table 4. Recycling Audit – Percent of total volume of waste by source, in descending order (UBCO waste audit, October 4, 2018).

Building source	Percent of total recycling
EME	20%
Arts	14%
UNC	14%
CCS	11%
ASC	11%
Fipke	8%
Science	8%
Admin	6%
Library	5%
Gym	1%
Purcell *Sample	3%
RHS	0%

RETURNABLE AUDIT

The results of the returnable audit indicate that of the 523 L of waste audited, 83% was returnable, 13% was recyclable, 3% was garbage, 1% was compost. Specific details and breakdown on the volumes of waste can be found in the tables and figures below.

Table 5 shows the complete breakdown of the returnable audit, including the volume of waste from each building and in each waste category, the percentages of each category, and totals in litres and percent. *Note: semi-total rows occur within the table in darker colours

Table 5. Returnable Audit - Volume of waste (in Litres and %) measured by type of waste for each building/area on campus (UBCO Waste Audit, October 4, 2018).

Type of Waste	Origin of Waste													
	Admin		Arts		CCS		EME		Fipke		ASC		Total	
	%	L	%	L	%	L	%	L	%	L	%	L	%	L
Plastic Containers	5	3	2	2	0	0	2	4	1	2	5	4	3	15
Paper Products	5	3	0	0	0	0	1	1	1	2	6	4	2	10
Cardboard & Boxboard	0	0	0	0	0	0	3	5	4	5	0	0	2	9
Tin & Aluminum	0	0	0	0	0	0	0	0	1	2	0	0	0.3	2
Paper Coffee cups	0	0	0	0	8	1	5	8	19	21	1	0	6	31
Other Comingled Recycling	0	0	0	0	0	0	2	3	0	0	0	0	0.6	3
Total Recyclables	10	7	2	2	8	1	13	21	27	30	13	8	13	70
Refundable Cans & Bottles	88	61	93	93	63	9	84	135	61	69	86	58	81	423
Glass Jars & Bottles	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Plastic Bags & Overwrap	0	0	2	2	0	0	1	1	3	4	0	0	1	7
Styrofoam	0	0	3	3	0	0	0	0	0	0	0	0	0.6	3
Total Returnables	88	61	98	98	63	9	84	136	65	73	86	58	83	433
Organics (Food & Yard Waste)	0	0	0	0	0	0	1	1	0	0	0	0	0.3	2
Paper Towel & Napkins	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0.4
Bio-Containers & Utensils	0	0	0	0	0	0	2	3	0	0	0	0	0.6	3
Total Compostables	0	0	0	0	0	0	3	4	1	1	1	0	1	5
Garbage	2	1	0	0	28	4	0	0	8	9	1	1	3	15
Other	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Garbage	2	1	0	0	28	4	0	0	8	9	1	1	3	15
E Waste	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Reusable Items	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Other	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Waste Volume	13.2%	69	19.1%	100	2.6%	13	30.8%	161	21.6%	113	12.8%	67	100%	523

The percentage of waste identified within each category is represented in Figure 5. Note that sub-categories within each of the five main waste categories (recycling, returnable, compost, garbage, and other) are shown in different shades of the same colours (i.e. all recycling items are in different shades of blue)

Figure 5. Returnable audit - Percent of total volume of waste by type for all buildings/areas on campus (UBCO waste audit, October 4, 2018).

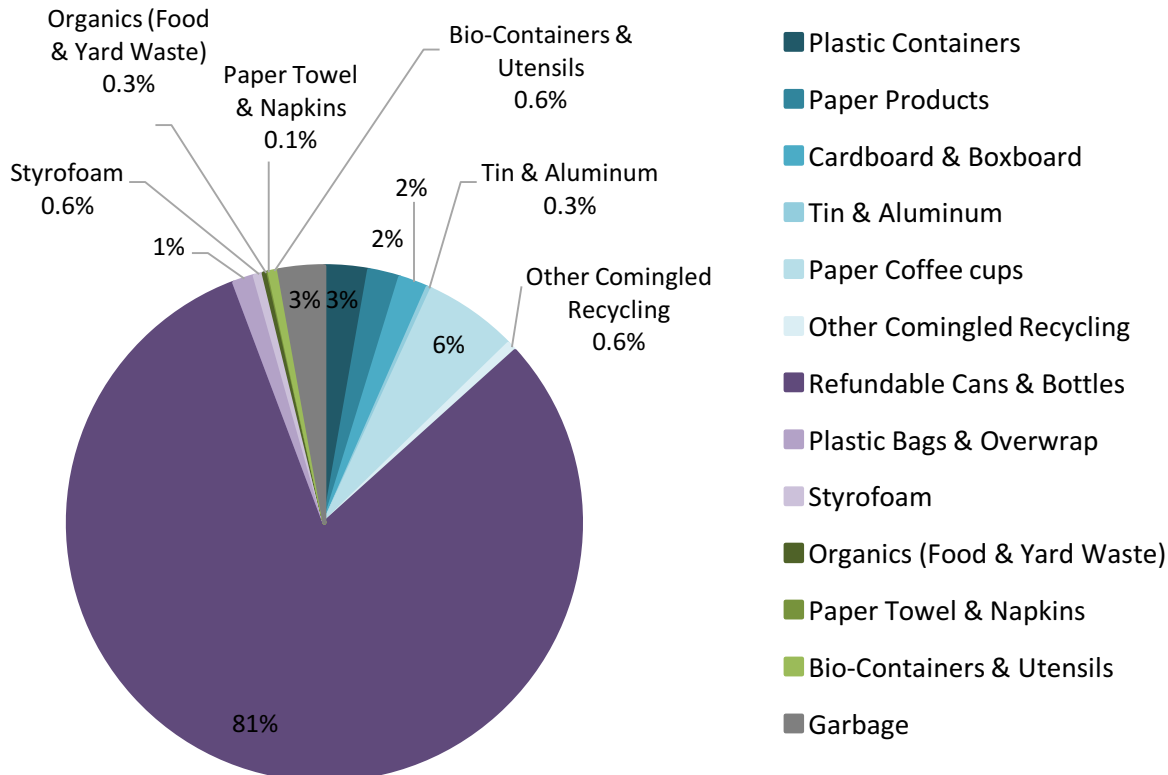


Figure 6 and Table 6 below show the volume of waste collected from each building. Of the areas that were collected, those that produced the largest quantities of returnables were the EME, Fipke, and Arts buildings. *Note: There was no separated returnable samples collected from the Gym, Library, Purcell, RHSC, Science, or UNC. These were either not collected, or they accidentally got mixed up with the recycling samples.

Figure 6. Returnable Audit - Percent of total volume of waste by source (UBCO waste audit, October 4, 2018).

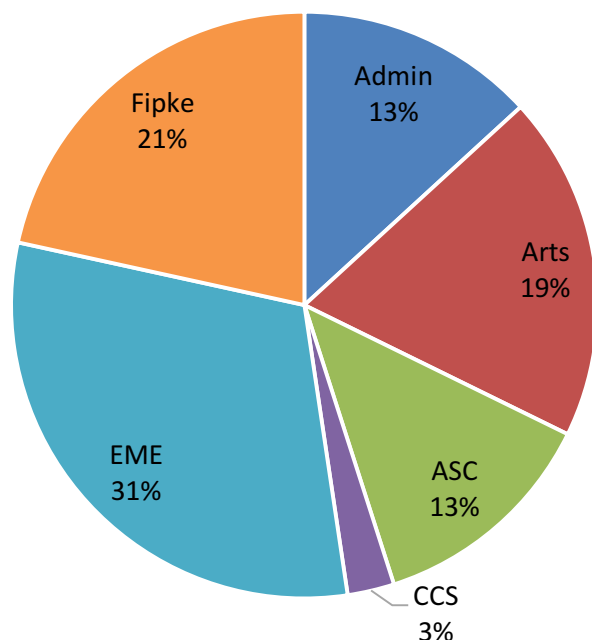


Table 6. Returnable Audit – Percent of total volume of waste by source, in descending order (UBCO waste audit, October 4, 2018).

Building source	Percent of total returnables
EME	31%
Fipke	22%
Arts	19%
Admin	13%
ASC	13%
CCS	3%

COMPOST AUDIT

The results of the compost audit indicate that of the 40.4 L of compost waste audited, 100% was compostable items. No contamination was found in the sample.

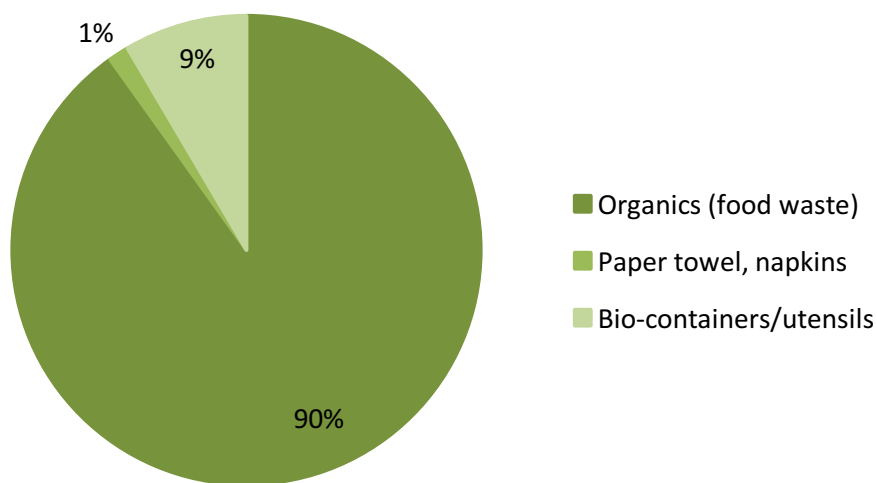
Specific details and breakdown on the volumes of waste can be found in Table 7 and Figure 7 below.

For the purpose of this audit, paper towel was included in the compost category, even though it is not currently included in the composting program at UBCO.

Table 7. Compost Audit - Volume of waste (in Litres and %) measured by type of waste (UBCO Waste Audit, October 4, 2018)

Type of Waste	Volume (L)	%
Organics (food waste)	36.4	90%
Paper towel, napkins	0.6	1%
Bio-containers/utensils	3.4	8%
Totals	40.4	100%

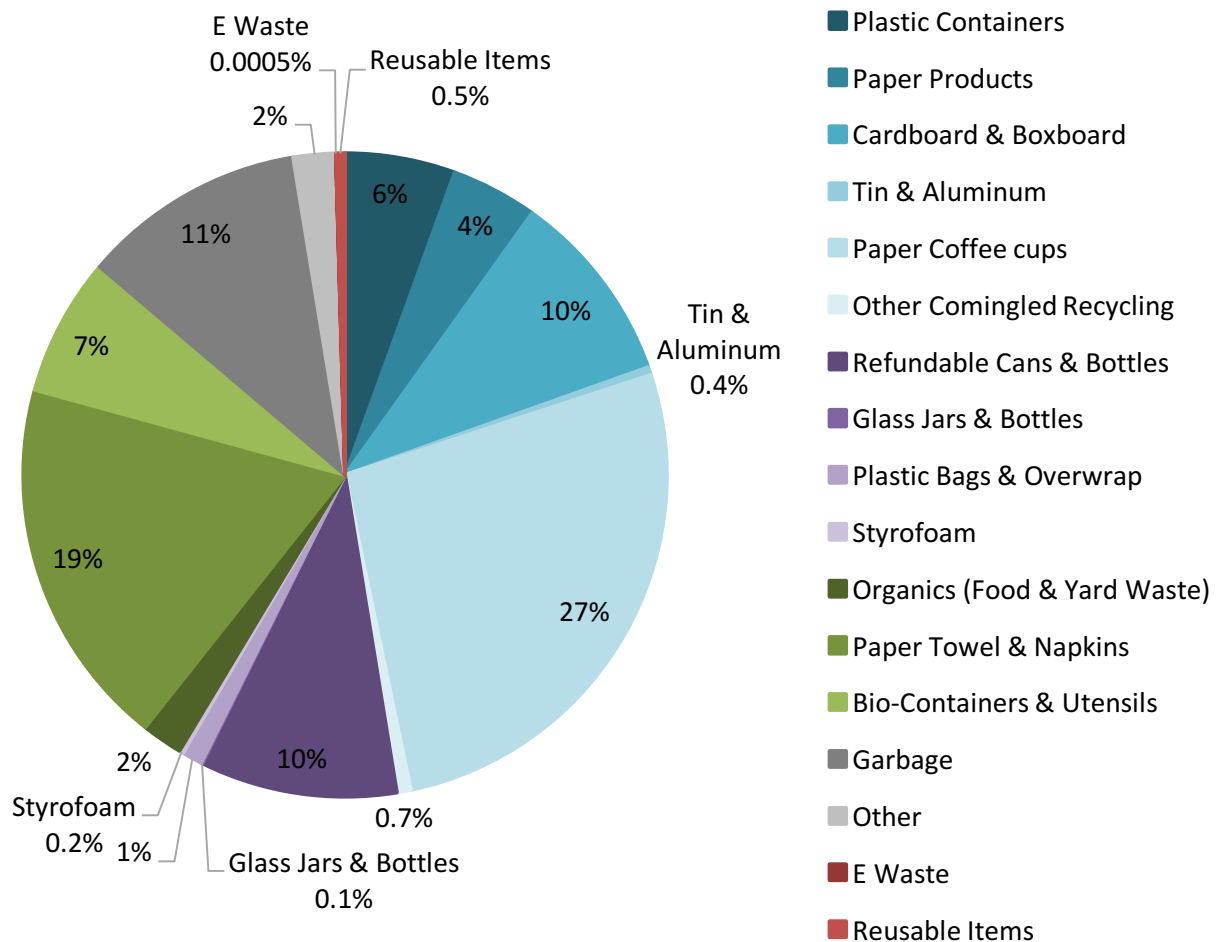
Figure 7. Compost audit - Percent of total volume of waste by type (UBCO waste audit, October 4, 2018).



ALL AUDITS

Figure 8 below shows the results from the garbage, recycling, returnable, and compost audits combined, giving an indication of the overall composition of waste created in one day at UBCO.

Figure 8. Garbage, recycling, returnable, and compost audits combined - Percent of total volume of waste by type for all buildings/areas on campus (UBCO waste audit, October 4, 2018).



OBSERVATIONS BY TYPE OF WASTE

The observations presented in this section are focused on the garbage audit results only.

Note: The garbage audit included the garbage bins from the bathrooms, which contain mostly paper towel (*these were not included in 2016). This makes a big difference in the garbage audit results because paper towels make up a large proportion of the overall garbage stream at UBCO; in 2014 they were 29%, and in 2018 they were 34%, whereas in 2016 when bathroom garbage was excluded, they were only 8%. Omitting bathroom waste in 2016 skewed the percentages of all other waste categories, therefore the 2018 results are more comparable to the 2014 audit.

RECYCLING

Of all the garbage bags collected, recycling accounted for 31% of the waste (a 20% decrease from 51% in 2016, and an 11% decrease from 42% in 2014). For the purpose of this audit and report, recycling is defined as those items which are accepted in the blue bin and by your commercial hauler (plastic containers, paper products, cardboard & boxboard, tin & aluminum, and other comingled recycling).

Of the 31% in recyclable materials, the largest sub-category was paper coffee cups (21%), followed by plastic containers (5%), cardboard & boxboard (3%), paper products (2%), tin & aluminum (0.4%), and other comingled recycling (0.4%).

The buildings on campus with the highest percentage of recycling contamination found in the garbage were: Library (44%), Arts (34%), and CCS (34%).

RETURNABLES

Of all the garbage bags collected, returnables accounted for 5% of the waste (a 2% decrease from 7% in 2016). For the purpose of this audit and report, returnables are defined as those items which are accepted at the return-it depots (refundable cans & bottles, glass jars & bottles, plastic bags & overwrap, and Styrofoam).

The 5% in returnable materials was composed of refundable bottles and cans (3%), plastic bags & overwrap (1%), Styrofoam (less than 0.2%), and glass jars & bottles (0.1%).

The buildings on campus with the highest percentage of returnables found in the garbage were the Library (9%), UNC (7%), and Gym (7%).

COMPOST

*Note: In 2016 the waste sample omitted the paper towel waste from bathrooms, thus decreasing the paper towel volume found in the garbage significantly. However, in 2014, the sample collection methodology was the same as in 2018 (paper towel waste from the bathrooms was included), which makes the results more comparable.

Approximately 44% of the total waste audited was compostable (a 25% increase from 19% in 2016, and a 5% increase from 39% in 2014). This included paper towel and napkins (34%), bio-containers and utensils (7%), and organic food and yard waste (3%).

The buildings on campus with the highest percentage of compostable material found in the garbage were RHSC (60%), Gym (55%), and Admin (54%). If looking at food waste only (the only sub-category that is accepted in the on-site compost program), the building with the highest percentage found in the garbage was the sample from Purcell (14%). All other buildings had 2-4% organics in the garbage stream.

GARBAGE

Garbage accounted for approximately 19% of the waste audited (a 3% decrease from 22% in 2016, and a 4% increase from 15% in 2014).

The buildings on campus with the lowest percentage of garbage found in the garbage were ASC (14%), Library (15%), Admin (15%), and Arts (15%).

OTHER

Other divertible items accounted for 0.8% of the garbage audited (a 0.2% decrease from 1.0% in 2016, and a 0.8% decrease from 1.6% in 2014). This included reusable items such as dishes, clothes, food containers, and unfinished toilet paper rolls (0.8%), and electronic waste such as CDs and wires (0.0004%).

The buildings on campus with the highest percentage of other divertible items found in the garbage were ASC (4%), CCS (3%), and the Library (2%).

OVERALL

37% of the waste found in the garbage could be diverted into an existing program on campus (i.e. recycling, returnables, compost, e-waste), while 44% has the potential to be diverted if new/different systems were set up (i.e. other depot items, compostable paper towel and biowares, reusable items).

Table 8. Comparison of the potential fate of items found in the garbage audit from 2014 to 2018.

Percentage of waste found in the garbage audit:	Year		
	2014	2016	2018
Could be diverted into an existing program on campus	50%	61%	37%
Potential to be diverted if new/different systems were set up	35%	18%	44%
Counted as "true" garbage	15%	22%	19%

YEAR OVER YEAR COMPARISON FROM 2008 TO 2016

The four figures and tables below show comparisons in garbage audit results from 2008 to 2018.

Figure 9. Comparison of UBCO waste sample sizes (volume in litres) for 1-day audits from 2008 to 2018.

Note: Does not include residence sample for 2014 or 2018 audits.

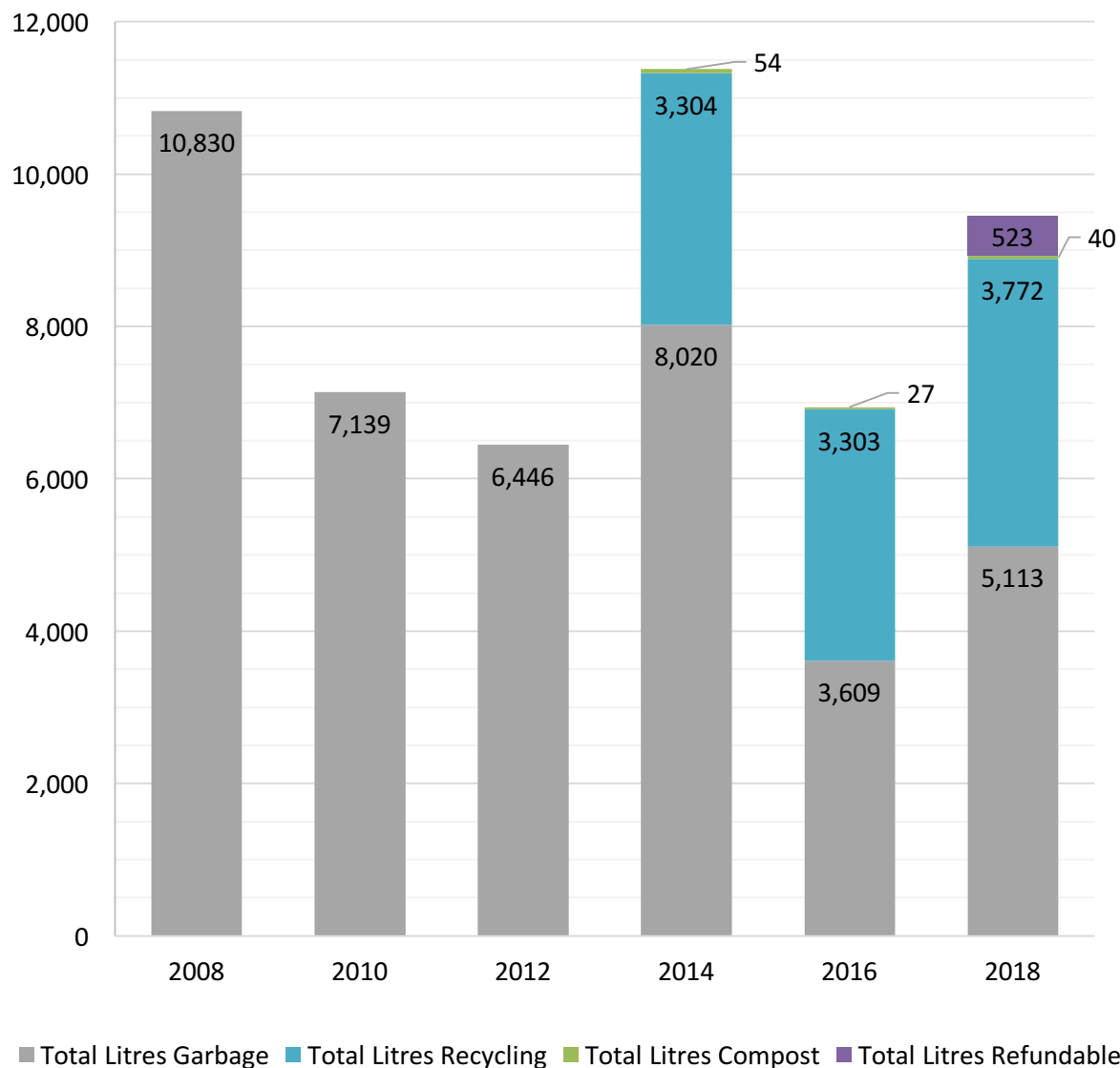


Figure 10. Comparison of percent of total volume for waste categories in UBCO garbage audits from 2008 to 2016.

Note: Paper towel (compostable) not collected from bathrooms in 2016.

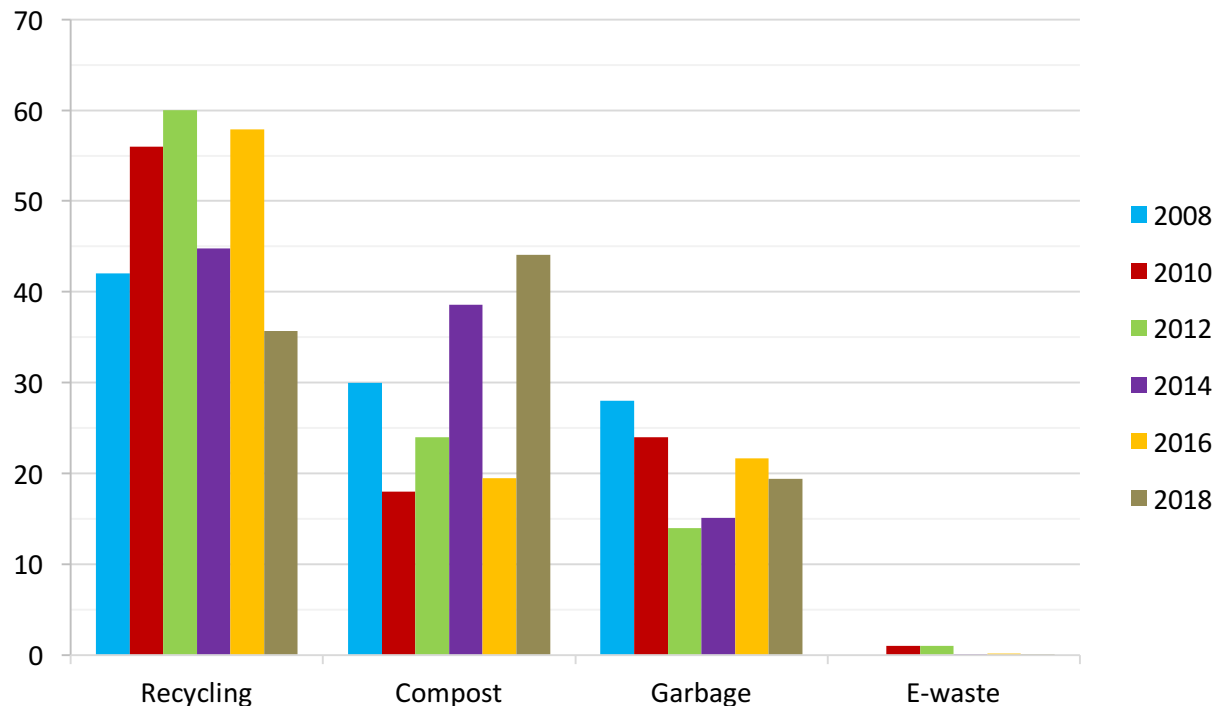


Table 9. Year over year comparison of percent total volume of waste by source in the garbage audit only (UBCO garbage audits, 2008-2018).

Source Building	Year					
	2008	2010	2012	2014	2016	2018
Admin	18%	1%	1%	-	2%	7%
Arts	20%	25%	11%	12%	0.2%	14%
ASC	-	3%	7%	5%	22%	9%
CCS	6%	6%	4%	4%	1%	5%
Courtyard	-	-	-	10%	6%	-
EME	-	-	12%	18%	14%	12%
Fipke	6%	6%	6%	11%	3%	7%
Gym	28%	1%	2%	2%	-	2%
Library	12%	18%	10%	20%	25%	15%
Offices	-	38%	35%	-	-	-
RHSC	-	-	1%	2%	2%	1%
Science	10%	3%	8%	8%	17%	11%
UNC	-	-	4%	8%	7%	16%

Table 10. Year over year comparison of UBCO garbage audits: percent of total volume of waste by type.

Volume of Waste by Type (%)	2008	2010	2012	2014	2016	2018	Change (2016 to 2018)	Change (2014 to 2018)
Plastic Containers & Film	18%	15%	24%	12%	11%	6%	Better	Better
Paper products	13%	12%	8%	5%	31%	2%	Unknown	Better
Disposable cups	14%	25%	24%	20%		21%	Unknown	Slightly worse, needs improvement
Cardboard & Boxboard	6%	2%	2%	5%	9%	3%	Better	Better
Tin & Aluminum	0%	2%	0.2%	0.4%	1%	0.4%	Better	Same
Other Comingled Recycling	-	-	-	-	0.8%	0.4%	Better	n/a
Waxed Dairy Containers	-	0%	0.3%	0.4%	-	-	n/a (now included in comingled recycling)	n/a
Refundable Bottles & Cans	4%	0%	3%	2%	3%	3%	Same	Slightly worse
Glass	0.3%	0%	0%	0%	0.6%	0.1%	Better	Slightly worse
Styrofoam	4%	1%	2%	1%	0.5%	0.2%	Better	Better
Wet Organics	10%	13%	6%	5%	6%	3%	Better	Better
Paper Towel & Bioware	21%	5%	18%	33%	13%	41%	Worse, needs improvement	Worse, needs improvement
E-Waste	-	1%	0.7%	0.1%	0.1%	<0.1 %	Better (trace found in garbage)	Same
Reusable	-	-	-	0.1%	0.9%	0.8%	Better	Slightly worse
Garbage	11%	23%	13%	15%	22%	19%	Worse, needs improvement	Better, needs improvement

***Notes:**

- Bathroom garbage (composed of mainly paper towel, and classified as “compostable”) was not included in the waste audit sample in 2016. This is the main reason why paper towel percentage is down by 20%.
- The low number in the case of garbage indicates a need for improvement because the goal is to have 100% garbage in the garbage audit. An overall improvement would be more actual garbage and less of everything else.

RECOMMENDATIONS FOR IMPROVEMENT

The following recommendations are intended to help guide improvements in the collection and disposal of recyclable, returnable, compostable, and hazardous waste materials. Each section is aimed at creating programs, policies, or pilot projects to reduce waste heading to the landfill. Education and communication are a key component to the success of every recommendation.

A list of relevant recommendations from 2016 and 2014 that are still applicable to UBCO campus are available in Appendix A.

Recommendations marked with an asterisk (*) indicate the key recommendations.

REDUCING AND REUSING

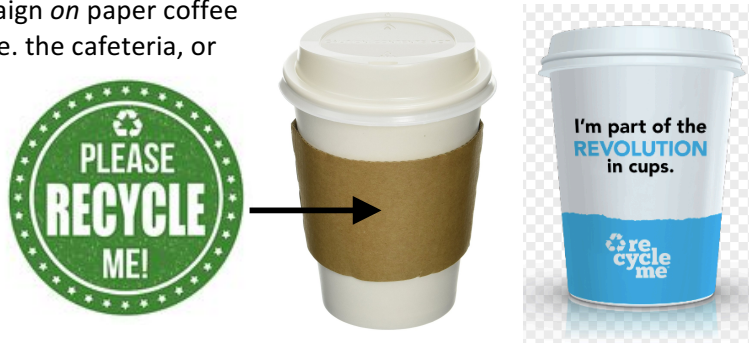
- *Convert more bathrooms to have high-efficiency hand dryers *instead* of paper towels. Target busiest buildings first (Library, UNC, EME). For very busy buildings, consider the in-sink style dryers to reduce line-ups for wall-mounted hand dryers.
 - Example: Dyson Airblade wash and dry, or other models
- Aggressively promote the use of reusable coffee mugs. Charge more for paper cups (this will speak loudly) or give discounts for using reusable mugs (this will give incentive mostly to people who already own one).
- Work with a supplier to buy x# reusable mugs (wholesale) and hold a special event where they are sold for a nominal fee (under \$5 ideally, or at cost) directly from the coffee outlets that you can work with. When a customer wants to purchase a coffee, the staff can ask, “would you like to purchase a reusable mug today for \$__”. Sweeten the deal by creating a prize draw for anyone who purchases one. The prize could be a GC for that coffee outlet. Try this for the whole month of September or until quantities last. Start with a small number of mugs (50?) and try it for even a week even and find a way to measure the impact (i.e. to a mini spot-audit on one or more waste bins in the building where coffee is sold to look for an improvement)
- Consider starting a reusable mug deposit program. Serve hot drinks in reusable mugs (with a lid, ideally) and include a substantial deposit fee for every transaction (i.e. \$2 or up to equal to the cost of the mug). Upon return, the purchaser will get their deposit back, and the mug can be washed and reused. Consider this will require additional dishwashing. This could be started small and scaled up, if successful.
 - Example: KeepCup wholesale



- During the audit, it was found that there are often several small black garbage bags within one large black bag. Wherever possible, have custodians empty garbage bin contents into the large black bags instead of taking the whole bag. Taking the whole bags can occur when necessary (i.e. if it's very dirty or messy) or on a regular interval (i.e. once a week). This would reduce the usage of garbage bags themselves, which accounted for 4% of the total garbage stream.
- Eliminate all single-use Styrofoam from campus. Create policy to prohibit purchase of Styrofoam plates, bowls, etc. for special events.
- Develop a punch card program where stamps are rewarded when coffee purchased in a reusable mug. Once 10 stamps collected, reward is a free coffee. (This was Stephanie's brilliant idea!)

RECYCLING

- New regulations in China have drastically reduced the types of recycling they will receive from global markets, which is causing a major upset in the recycling industry worldwide. Looking to the future of changes coming to the recycling sector, get ready for the possibility of separating recycling streams, or other major changes. If/when this change occurs, work to use your existing bins and infrastructure effectively while changing the signage and communications around recycling. Keep in close contact with your recycling hauler and Cascades Recovery about this issue and try to stay ahead of the curve the best you can.
- Consider setting up a drop-off location for Recycle BC's "other flexible packaging" pilot program. Designate someone to drop this off at the closest Columbia Bottle Depot (680 Dease Road, Kelowna) when you have enough.
- *Consider an advertising campaign *on* paper coffee cups/sleeves where possible (i.e. the cafeteria, or other food outlets that you have any control over). Design and order cups and/or sleeves that prominently say something like "recycle me" with the recycling symbol, and colours that match your recycling bins (blue).
 - See examples:



COMPOSTING

- *The compost sample that was collected for the audit was not contaminated (although it did contain 10% paper towel and bio-containers, which are technically not accepted in the compost program), but a lot of composting potential is being missing from the rest of campus. In the one day sample, 162 litres of food waste was found in other waste streams (mostly the garbage, at 148 L) compared to the 36 L of food waste found in the compost audit. To enhance waste

reduction at UBCO, work on capturing this potential. Add compost bins in more areas; try one per floor, instead of one per building. Target busiest buildings first: Science building and Arts building had the most food waste in the garbage, followed by UNC and EME.

- There is a *lot* of paper towel waste in the garbage stream; they are by far the largest proportion of your waste stream, at 34% of garbage and 19% of total waste audited. There are two main ways to improve this problem:
 - 1) Eliminate or reduce paper towels by installing more hand dryers (See reducing section above)
 - 2) Composting paper towels
 - a) Consider expanding/enhancing the on-site compost system to accommodate increased volume of paper towels (this would work especially if you also expanded the food waste composting collection on campus, as described above). Add more earth tubs or even better, switch to a new and better system.
 - See more details about this in 2016 waste audit report
 - Example: Oklin International compost systems
 - b) Find a hauler to pick up and compost your paper towels.
 - Example: Valley Pro Recycling, Spa Hills Compost

SIGNAGE, EDUCATION, AND COMMUNICATION

- *Train and deploy a Green Police team on campus to guide students on how to divert waste. The task of a Green Police is to monitor a waste station and guide users on how to dispose of their waste items correctly. They also correct mistakes during busy periods to ensure proper waste diversion occurs. Target September when there are lots of new students on campus. Target bins in each building (to interact with as many students as possible). Ideas on who to get involved: Student volunteers, Environmental sciences or sustainability classes, Environment club (ESS), Geography 400. This would make a big impact on student education; it's *live* education, not reading something that's easy to ignore.
 - See example:
- Conduct a survey to learn more about how to spark interest, foster awareness, and create behaviour change in waste diversion amongst students at UBCO. Select a focus group of students (i.e. randomly selected, not those who already "care"). Getting input from students themselves will help you to put your efforts in the right place and make them more impactful.



- The Admin building (which contains the cafeteria) is still a problem area. Compared to the other buildings on campus, it has the third highest percentage of compostable materials found in the garbage (54%), and the third lowest percentage of actual garbage found in the garbage (15%). Try an approach like at Orchard Park Mall food court where they hire a “waste valet”, who collects and sorts the waste appropriately into the correct bins. This could be piloted at peak hours in the cafeteria to increase proper waste diversion and show students how the waste bins are supposed to be used. A food tray rack/trolley might prove handy during very busy periods.
- *Revisit/review how sustainability (including waste diversion) is introduced to new students, i.e. when registering, during orientation, etc. Find a way to highlight UBCO’s commitment to sustainability and make it fun an interactive if possible. Perhaps introduce a recycling quiz or sorting game. Orientation events for new students are a good opportunity for mentioning sustainability on campus, including a section about waste diversion. During tours, point out the centralized 5-option waste stations so students are aware of their locations. In residence orientations, get the RAs to talk to new students about waste diversion.
- Invite a representative from RecycleBC or the RDCO Waste Reduction Office to set up a booth at campus sometime in September with an educational display and recycling sorting game that highlights the guidelines at UBCO.
- Expand the “sort it out” signage to more of the campus.
- Make sure *all* paper towel dispensers have the “it only takes one” reduction messaging. First start with buildings that produce the most waste (UNC, Library, Arts, EME, Science) then make sure all others have it as well.
- Paper coffee cups were 21% of the garbage stream, and 43% of them on campus are being discarded incorrectly. Add some specific “no paper coffee cups” signage on the garbage bins, and “paper coffee cups” with a green check mark on the recycling bins will help to *really* emphasize where they are supposed to go. Do this in busy buildings and problem areas: Library and Arts, then EME and Science.
- Consider adding/enhancing paper coffee cup recycling signage at franchise coffee outlets. Leverage space/surfaces owned by UBCO (i.e. glass windows).
- The building with the worst contamination in the returnable stream (that was captured by this audit) was Fipke. Major contaminants were garbage, coffee cups, and other recycling. Target some specific messaging on the returnable receptacles (and in general, with posters) in this building.
- Create a Sustainability course, including a section on waste diversion, in “Canvas” and any other online learning platforms used on campus that is mandatory for students complete (once, each year, or each semester – repetition can help!).

INFRASTRUCTURE

- Enhance the waste stations in the bus loop area. This area mostly has garbage only. Add recycling bins (at least) and include signage/colours that are consistent with the rest of campus.
- There are wonderful waste sorting stations in a key areas; expand these to more areas on campus. People will not pack around their waste till they find the appropriate bin (especially for compost!).
- The compost bins must be opened to use them. Consider using that style of bins for other waste streams as well to increase thoughtfulness when discarding waste.
- Expand the waste carousels to more areas (currently in Arts building and Science building only). Complete in phases, if necessary. Target problem buildings and high waste producing buildings first (Library, UNC, EME, CCS, and Admin).
- *The biggest problem area on campus is the library. When compared to other buildings, its garbage stream has the most recycling, most returnables, third most 'other' items, and second least 'true garbage'. Assess and scale up all waste diversion tactics in the library; bin placement, signage, and messaging/communications.
- Install another station like the new one in the cafeteria in the library; this is a problem area (35% of total garbage was paper coffee cups).

RESIDENCES

- *The two biggest contaminants in the sample of residence garbage were plastic containers and food waste. Make a concerted effort to include an entire residence building in the next audit or do a full-scale residence audit on an alternating (odd) year. Aim for residence audit in fall 2019. Include lobby/common areas *and* in-room waste in the audit.
- Encourage or host a competition between residence buildings to see who can recycle better. Add a prize as incentive.
- Supply residence rooms with waste and recycling bins and signage so they are better equipped to divert waste properly.

2020 WASTE AUDIT (LOGISTICS, COMMUNICATIONS, AND PARTICIPATION)

- Continue to include all waste streams that you want to learn about in the audit (it has now expanded to four: garbage, recycling, compost, and returnable).
- Include any new building(s) in the scope next audit (i.e. Upper campus health building, the Commons).

- Continue to include bathroom garbage, comprised mostly of paper towel, but exclude in-stall waste.
- Include outdoor areas next audit. Use same methodology as other sampling; make sure the bins are emptied the day before the sample day, then collect at the end of the sample day. It's important to include the outdoor area in the audit as it's been a problem area in the past.
- Separate the audits into their own areas. For a few audits in a row now, bags tend to get mixed up even when efforts are made to keep them in the right category/row (ex. Some returnables got mixed up with recycling this year). Although it will require more A-frame signs, delineators, or other signage methods, having the audits on separated tarps or be clearly separated in another way would ensure the best results.
- Several bags of waste were brought over to the audit mid-morning after sorting had begun because they were emptied from bins mid-day and held somewhere, then almost forgotten about on the day of the audit. Try to avoid these 'secret stashes' by improving communication among staff involved in collecting bags for the waste audit.
- Continue to work with Dr. Matthew Nelson's SUST 100 class and perhaps expand on this type of volunteer recruitment with other classes if the audit continues to grow.
- In order to attract more volunteers to participate in the waste audit (if necessary) include a draw prize (such as a zero-waste gift basket!).
- Continue with and bolster campus communications re: waste audit. Let people know what's going on and why. Include everybody (students, staff, faculty, etc.).
- Continue with the educational component at the audit (i.e. Stephanie French) to speak with and answer questions of people walking by. (See image below)



CONCLUSION

The 6th biennial UBCO waste audit was very successful with the new team of volunteers from the SUST 100 class participating for class credit. The returnable stream was added to the scope which provided some insight into the type and quantity of contamination going on in that stream. Similar to the 2014 and prior waste audit sampling methodology, paper towel waste from the bathrooms was once again included in the audit, instead of being excluded like in 2016.



The audit results showed some improvements and some declines. Contamination within the garbage stream increased since 2016, but there were many recyclable items found in the garbage in lower percentages than the last audit. However, there is still lots of room for improvement.

The data collected in this year's waste audit shows the two items taking up the majority of the waste stream are paper coffee cups and paper towels, both of which have the possibility to be diverted. Since paper coffee cups are already accepted in the recycling at UBCO, this is worth focusing on and increasing efforts to improve diversion moving forward. It would also be very impactful to find a better solution for the paper towel than sending them to landfill.

New regulations in China have drastically reduced the types of recycling they will receive from global markets, which is causing a major upset in the recycling industry worldwide. Looking to the future of changes coming to the recycling sector, get ready for the possibility of separating recycling streams, or other major changes. Keeping in close contact with your recycling hauler and Cascades Recovery about this issue will help you to stay ahead of the curve.

UBCO has been making many changes, additions, and improvements to waste reduction efforts on campus including some of the recommendations from the last waste audit report, and the main area that needs attention remains education and communication. With a student population that is constantly changing over and coming from different cultures all over the world, it is important to provide education that is understandable and meaningful to everyone. This means going above and beyond signs on waste bins to say what goes where; it includes helping people to understand *why* they are being asked to take certain actions around waste reduction, and inspiring a desire within them to do what's right.

Evaluate which of the recommendations in this report are within the scope of UBC Okanagan's financial and human resources and use these as opportunities to showcase UBCO as a forward thinking green campus. In order for sustainability practices to be successful, the concept and practices need to be integrated into every aspect of campus life. Empowering and supporting the students and staff to act in accordance with the sustainability values that UBCO embodies will sustain behavior towards effective and efficient waste diversion practices.

RESOURCES

GreenStep is available as a local resource to help UBC Okanagan establish or implement any of the recommendations and action items in this report. We are also available to solve issues that may arise and answer any questions.

GreenStep Solutions Inc.

Ph: 250-862-8941

angela@greenstep.ca

andrea@greenstep.ca

www.greenstep.ca

Regional District of Central Okanagan - Waste Reduction Office

Ph: 250 469-6250

recycle@cord.bc.ca

<https://www.regionaldistrict.com/your-services/waste-reduction-office.aspx>

Local Recycling Directory

http://www.regionaldistrict.com/media/21318/2004_recycle_dir.pdf

Recycle BC plastic packaging pilot (website and PDF resource)

<https://recyclebc.ca/flexiblepackaging/>

https://recyclebc.ca/wp-content/uploads/2018/06/Material-List_Other-Flexible-Plastic-Packaging.pdf

Valley Pro Recycling

<http://www.valleyprorecycling.ca/>

Spa Hills Composting

<https://spahillscompost.ca/>

Columbia Bottle Depot - Rutland

<https://www.return-it.ca/locations/columbia-bottle-depot-rutland/>

Dyson Airblade hand dryers

<https://www.dysoncanada.ca/en/hand-dryers.html>

Keepcup

<https://ca.keepcup.com/wholesale-enquiries>

Oklin International composting systems

<http://oklininternational.com/>

Zero Waste Campuses (GrassRoots Recycling Network)

<http://www.grrn.org/page/zero-waste-campuses>

Dalhousie University: Waste bin standards implementation

<https://www.dal.ca/dept/facilities/services/waste-bin-standards-implementation.html>

News article: "London's workers urged to recycle 5m coffee cups in 2017 through square mile challenge"

<https://resource.co/article/london-s-workers-urged-recycle-5m-coffee-cups-2017-through-square-mile-challenge-11770>

UVIC Zero Waste program (move outs and events)

<https://www.uvic.ca/sustainability/topics/waste/zero-waste/index.php>

UVIC waste reduction video series on YouTube

<https://www.youtube.com/playlist?list=PL0dV9QfxhOxCXcXlpqjhxg3y7TBvuwbuo>

Western University – Waste reduction

http://sustainability.uwo.ca/initiatives/waste_reduction/index.html

University of Oregon: Zero Waste Program

<https://cpfm.uoregon.edu/zerowaste>

APPENDIX A

Relevant recommendations from 2016 and 2014:

REDUCING AND REUSING

- Create an on-campus “free store” where students can drop off unwanted items that are in good condition. Other students can take items for free if they are needed.
 - This could be a student project or taken over by an ongoing club or group.
 - Could also be adapted for residence, especially during turnover time when many items that would be useful for arriving students are discarded by departing students.
- Expand the use of compostable food utensils and plates into all food service areas on campus
- Connect with the major food services suppliers (GFS, Sysco) and ask them to provide food with reduced packaging. Bulk items or larger shipments on dry goods can substantially reduce the amount of cardboard/boxboard that is being produced.
- Create a campus-wide policy to eliminate single serving items such as creamers, sugar packets, plastic stir sticks, ketchup, mustard, butter, and any other single serving items.
- Create and implement a Zero Waste Policy to eliminate disposable products during meetings and conferences. Only reusable items can be used such as coffee urns, water jugs, reusable coffee cups, and water glasses. Research policies at other universities/organizations.

RECYCLING

- Create a drop off location on campus for returnable depot items other than refundable cans and bottles. This includes Styrofoam, plastic bags and overwrap, and glass bottles and jars. Coordinate transportation of these items to a recycler.
- Eliminate all stand-alone garbage bins – either remove the bin, or add at least a recycling option and where possible, the 4-stream option (garbage, recycle, refundable, compost). Use big belly solar compactors wherever possible (outdoors). Remove the stand-alone 8-ft garbage bin embedded in the concrete outside Tim Horton’s in the courtyard area. This space could be capped or repurposed as a planter.

COMPOSTING

- Spa Hills Compost offers commercial composting to businesses and buildings in the Columbia-Shuswap-North Okanagan area.
 - Worth exploring the possibility of inviting them to pick up waste from UBCO, with a possible partnership of another organization in the area.
 - Weekly pick up service
 - Details can be found at www.spahillscompost.ca
- Implement Green Champions to take responsibility of office compost bins. This should be embedded into the stewardship component of a position’s job description. This way if there is employee turnover, the responsibility for the compost remains within the job.

EDUCATION AND COMMUNICATION

- Make education on waste reduction practices a priority on campus. While the student population constantly changes and UBCO welcomes new students from all over the world, good communication and education regarding waste practices is crucial and must be ongoing.
 - Organize a landfill tour and/or Cascades Recovery tour to help students understand the impacts of their waste behaviours.
 - Create a mind map about all the ways that things get communicated to students at UBCO (this could be a student project). Understand what the opportunities are, and which ones would make sense to use to communicate recycling/waste guidelines and best practices.
- Engage with students on waste reduction, go above and beyond just making educational resources available for them (i.e. The Recyclepedia, orientation manual). Resources such as this are wonderful to have but will only be used by those few students who choose to go out of their way to look something up. Student must be reached out to and engaged with on a larger scale to make a true impact on waste reduction on campus.

RESIDENCES

- Signage about what can and cannot be recycled, composted, and placed in the garbage should be consistent to what is located on campus.

WASTE AUDIT & PARTICIPATION

- Get the big picture. To really understand waste produced by UBCO and calculate your diversion rate for comparison to other post-secondary institutions, data from other waste sources on campus should be collected, such as: kitchen compost, large items (appliances), other metals, wood (pallets), laboratory waste, cigarette recycling, and any other special waste. This is especially important when calculating your carbon footprint as it related to your waste production.
- Consider organizing a longer sample period (i.e. two days) for buildings with very little waste, in order to get a better sample. Based on results from 2018, these areas included RHSC, and the gymnasium
- Have a booth at the Volunteer Fair at the beginning of the year. This is something GreenStep could spearhead.