The Final Straw
Analyzing waste through the context of the single use plastic ban at York University

by
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Abstract

Waste and waste management have become increasingly important issues in the drive towards sustainability and combatting climate change. In this research portfolio, I critically analyze waste and waste management within the context of Canada's impending national ban on single use plastics. My portfolio contains three separate components: primary research, a theoretical analysis, and reflections on research.

My primary research is based on the dialogical aspects of environmental education. I first examine waste and its management at York University using campus waste audit data. Then I use this data to create a survey on York students' beliefs and behaviours towards single use plastic and composting on campus. I applied the Theory of Planned Behaviour to craft survey questions. The Theory of Planned Behaviour provides a framework for understanding how students' attitudes, normative beliefs, and perceived behavioural control affect their behaviour. I distributed the web-based survey through This Week @ York, a weekly newsletter that is sent to all students at York University via e-mail. To analyze the survey results, I use a combination of quantitative statistical analyses and qualitative analysis by coding responses thematically. Last, I present environmental education material consisting of infographics and images for social media to equip students to better manage waste on campus.

The survey reveals that students have a desire for waste infrastructures but lack an awareness of the existing infrastructures on campus that they desire. These results suggest that environmental education material can be utilized to bridge the gap and communicate to students that York already has some of the infrastructures in place that they seek. My theoretical analysis on waste and waste management considers the concept of waste in the context of neoliberal governmentality and concludes that the responsibility of waste management is increasingly placed on the individual, including the single use plastic ban. This individualization of waste management can be combatted with collective action and stronger regulations that place the responsibility on producers rather than consumers.

Foreword

I originally came to this program to cultivate a more zero waste lifestyle by expanding my knowledge in waste management and policy. I also set out to engage in environmental education techniques to become a better educator. My research transitioned to focus on the single use plastic ban and how it would affect York's campus. Instead of becoming a better educator, I became a lifelong learner and am able to think critically after learning about environmental education. Some key courses that facilitated my learning process were Calvin Lakhan's Special Topics in Waste Management, Mark Winfield's Environmental Policy Courses, Traci Warkentin's Environmental Education course, and Lisa Myers' course on Food, Land, and Culture. Through my major research, I learned about the individualization of waste management, and I have since shifted to a low impact lifestyle in my personal life.

Although my personal views about waste shifted, my areas of concentration remained the same throughout my research. I focused on waste management, environmental policy, and environmental education. My final portfolio includes three chapters, *York University Impact Study; The Single Use Plastic Ban: Governmentality, Management, and the Responsibility of Waste; Reflections on Research.* The first chapter is my primary research which used a three phased plan- first to study York's current waste management, then to create a survey for students to better understand their waste related behaviours, and finally create education material that is curated for the students' needs to assist with the transition to the single use plastic ban. This research originally focused on the single use plastic ban but after learning more about York's waste streams, it evolved to include composting.

My portfolio also includes a chapter where I critically analyze the ways we define waste and how that limits the ways we manage and create policies around waste, including an analysis on the single use plastic ban. Lastly, my portfolio contains a reflection paper on my research and learning process. Overall, this research revealed that waste as an issue has been historically placed on the individual consumer rather than producers. The pressure is on the individual to make changes to their lifestyle rather than the systems to make sweeping change. This misdirected focus is seen in other areas of environmental policy, not just waste management. The single use plastic ban perpetuates individual responsibility and does little to address systemic issues of production and waste.

Acknowledgements

Thank you to my supervisor, or as I like to call her the Swiss Army knife Lisa Myers. You adapt your guidance and teaching skills to any topic to foster a safe and encouraging learning environment. Your ways of knowing are truly special and greatly facilitated my learning process. I am eternally grateful to have met such an inspiring woman like you.

Thank you to my advisor Mark Winfield for leading me through the program. Your guidance set me up for success. Although I dreaded it at the time, thank you for making me write so many long papers on environmental policy so that I could hone my writing skills.

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York University Impact Study

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Definitions

These definitions are for the purposes of this technical impact study

Waste- non-hazardous, solid materials to be sent to the landfill

Waste Diversion- actions taken to prevent waste from going to the landfill such as recycling

Waste Diversion Rate- the percentage of materials being diverted from the landfill

Divertible Material- material in the waste stream that could have been recycled but was sent to the landfill

Introduction

Waste management involves a set of responsibilities over the actions taken to manage and limit municipal solid non-hazardous waste, as designated by the government (Canada, 2017). Some of these actions or methods include reduction, reuse, recycling, composting, and creating new legislation. Waste management is a significant task in Canada because on average, Canadians produce 706kg of waste per person every year (Sensoneo, 2019). This equates to Canada sending 25 million tonnes of solid waste to the landfill annually (Canada, 2015). Creating waste has consequences for land use, climate change, air quality, human and animal health, and often results in environmental degradation.

Waste is a tangible issue that takes up space and usable land in landfills while also having intangible consequences as it gives off harmful greenhouse gasses that contribute to climate change (Environment and Climate Change Canada, 2017). In 2019, Ontario sent about 12 million tonnes of waste to the landfill, 27% of that was exported to landfills in the United States (Ontario Waste Management Association, 2021). This rate of landfilling waste is not sustainable, as Ontario is on track to run out of landfill space by 2034, and that is only if we continue to export at a 30% rate (Ontario Waste Management Association, 2021). The lengthy permitting and construction process for creating a new landfill can take several years (Chopowick, 2020). With time and landfill space running out, the province must take swift action through waste management to avoid this inevitable outcome.

The decomposition of organic materials in a landfill produces methane, a greenhouse gas that is twenty-five times more potent than carbon dioxide in relation to its warming potential towards climate change (Environment and Climate Change Canada, 2017). In Canada, methane from landfills accounts for 20% of the nation's total methane emissions (Environment and Climate Change Canada, 2017). Waste management practices like composting organic materials can limit methane from entering the atmosphere, thus limiting the warming that causes climate change (IPCC, 2018). Limiting the warming from methane emissions would reportedly have an immediate benefit for air quality and human health (IPCC, 2018).

A recent study completed by the Center for Microbial Oceanography: Research and Education and the University of Hawaii at Manoa found that plastics also emit greenhouse gasses when exposed to degradation by the sun, in other words plastic as litter in the environment contributes to climate change (Royer et al., 2018). Not only are plastics emitting greenhouse

gasses, they degrade into microplastics and are persistent in the environment as organic pollutants, harming animal and human health (Bergmann et al., 2015). The Canadian government has even classified microbeads, a form of microplastics, as toxic under Schedule 1 and banned the use of microbeads in toiletries due to their negative health and environmental impacts (Government of Canada, 2015). These legislative actions by the government that aim to properly manage waste will limit potential emissions and in turn the risk to all living beings.

A study by Sensoneo, a global waste management solutions company, created a Global Waste Index to compare 36 countries in the Organization for Economic Co-operation and Development (OECD) and their waste management practices (Sensoneo, 2019). The study found that when you consider the methods for waste management, Canada ranks as the eighth worst country in the world in its waste management practices (Sensoneo, 2019). Overall, Canada's landfills emit 19 million tonnes of carbon dioxide equivalent annually (Environment and Climate Change Canada, 2017). For perspective, this is the same as the emissions from driving 4 million vehicles on the road annually (US EPA, 2015). Although ranking as eighth worst in the world is poor and our waste related emissions are significant, improving these numbers is possible through waste management techniques. This is why waste management is important; reducing waste would have obvious tangible impacts but would also have social and environmental benefits. Waste management is one angle to tackle climate change.

I selected York University as a case study because of the positive impact a rigorous waste management system could have on its sustainability plan. As the third largest university in Canada, York University has the potential to lead the way towards positive environmental change and arguably has the social responsibility to do so (McAlpine, 2020). York has over 53,000 active students, so they have the ability to educate young minds on sustainable actions for both campus life and life beyond university (McAlpine, 2020). York is uniquely positioned as one of the most diverse universities in Canada while also being situated in one of Toronto's most marginalized neighborhoods (Eizadirad, 2017; York University, 2021b). This offers an interesting case study in waste management.

The university has not published a comprehensive waste study since 2010 (Esseltine et al., 2010). An examination of the way York manages waste is necessary not only to see if improvements have been made since the previous report, but also to help guide the future of sustainability at York. I will first gather data about York's waste management. Then I will

conduct a survey based on my research that focuses on students' waste behaviours. Based on the results of the survey, I will create educational material that is curated for students to create the most positive and sustaining change. This type of student centred research is dialogical education and in a way is a collaborative effort. As I learn about York's waste management, I share with students what I learned through the survey and in turn, they share with me what they know and feel by responding to the survey. Finally, it will culminate in the production of education material that is specific to what students need that they contributed to. This impact study is the important first and foundational step in initiating this student centred learning.

York's updated University Academic Plan pledges to advance the United Nations Sustainability Development Goals (York University, 2020). Waste management practices at York are a key area where sustainability could be increased, especially when considering upcoming federal legislation such as the single use plastic ban that would necessitate changes around waste management. Nevertheless, the subject of waste and waste diversion has had a lack of research attention on campus, as exemplified by the fact that the latest research on York's waste was completed over ten years ago (Esseltine et al., 2010). As a student at York, I am invested in our campus' sustainability. I am more interested in the success of York's sustainability goals than a third-party consultant would be. My research fills a gap in reassessing York's waste management within the context of the impending federal single use plastic ban.

A History of York University and waste

As an educational institution, York University is considered as a part of the IC&I sector. The IC&I sector stands for the Industrial, Commercial, and Institutional sector and covers basically all divisions outside of residential or household waste. The IC&I sector's waste historically has not been as closely monitored as household waste, thus there is limited knowledge and data on its overall waste management practices. In Canada, the IC&I sector represents about 65% of the 25 million tonnes of waste sent to the landfill annually (Canada, 2015). It is estimated by the Canadian government that the IC&I sector is diverting about 20% of its waste, while a single family home in Toronto has a waste diversion rate of 64% (Canada, 2015; *Solid Waste Reports & Diversion Rates*, 2017). So, to increase waste diversion and attempt to make a dramatic difference in the amount of waste being sent to the landfills, Ontario enacted the 3R's regulation under the *Environmental Protection Act* (Ontario, 2017).

The 3 R's regulation includes three specific legislations for the IC&I sector, including O.Reg. 102/94 Waste Audits and Waste Reduction Work Plans (Ontario, 2017). In accordance with O.Reg. 102/94, universities must complete an annual waste audit, in which the amount and types of waste being produced are recorded. Waste audits are a useful waste management tool because they highlight areas and waste streams that may need improvement while also providing the waste monitoring data from an IC&I sector that the province has historically been lacking. York University's waste audits and their following reports will be discussed later in further detail.

York University markets itself as leader in sustainability and has had numerous achievements awarded for their positive environmental actions. York views sustainability as, "more than a promise to control our waste and energy. It is the lens through which we see everything we do" (York University, 2021d). York has been awarded Canada's Greenest Employer for six consecutive years based on its many environmental initiatives, including its ZeroWaste program (McLean, 2018). The ZeroWaste program began in 2010 with the initial short term goal of increasing waste diversion rates to 65% by 2013 (York University, 2010). Not only does York have a dedicated Office of Sustainability, York has also created the President's Sustainability Council, an advisory board in which a yearly Sustainability Report is conducted (York University, 2021c). The annual Sustainability Reports are made available to students and the public for review and date as far back as 2008 (York University, 2021c). In addition to these yearly reports, York created the Sustainability Strategy in 2017 that focuses particularly on people, knowledge, and place with both short and long term sustainability goals (York University, 2021d).

The Institute for Research and Innovation in Sustainability (IRIS) was created in 2004 as an organization at York University dedicated to research in sustainability but has since dissolved (York Media Relations, 2004). IRIS completed a comprehensive investigation of York's waste management and surveyed students on sustainability and waste (Esseltine et al., 2010). It has been over a decade since this report was completed and there has not been anything similar since then. An updated examination of York's waste management system is overdue. The report completed by IRIS will serve as a good comparison to this study and will offer insights on areas where York has improved or those areas that need improvement.

York's commitment to sustainability also moved them to ban plastic water bottles ahead of any government mandates (Sunshine, 2012). York began to phase out plastic bottled water on campus in 2012 and currently has no plastic water bottles for purchase on campus (York University, 2021d). This is worth applauding, but it is not a complete ban on plastic bottles as other single use plastic bottled drinks are still sold on campus. There is also evidence that a ban on the campus sale of plastic bottled water can actually increase the per capita consumption of other plastic bottled beverages (Berman & Johnson, 2015). Although York can list many achievements and declare themselves as a leader in sustainability, there is certainly room for improvement and still more work to be done in the field of waste management.

York's current waste management

Infrastructure

York has a tri-bin system in place for waste collection, which separates trash, paper, and other recyclable materials. York's tri-bins were implemented in 2005 and each have labels with pictograms on them to show users what is accepted in each bin, as shown in Appendix 1 (T. Haagsma, personal communication, January 28, 2021). Typical tri-bin systems separate trash, recyclables, and organics. Thus, the irregular tri-bin system York uses could lead to some confusion for users and contamination of the waste streams. Custodial services collects waste from tri-bins daily and empties them in larger centralized bins or compactors at loading docks throughout campus (J. Sanguedolce, personal communication, January 28, 2021).

Organics collection occurs in faculty areas, like faculty kitchenettes and are collected weekly by custodial services (J. Sanguedolce, personal communication, January 28, 2021). The collected organics are emptied into a centralized collection area to be processed by a third party, Waste Reduction Group (J. Sanguedolce, personal communication, January 28, 2021). Student facing organics collection is not available at this time. This is because the third party that processes the organics has a low tolerance for contamination (J. Sanguedolce, personal communication, January 28, 2021). In the past, students have been shown to leave high levels of contamination in organic bins, so the organics collection service is only available to faculty at this time (J. Sanguedolce, personal communication, January 28, 2021). York's Facility Services is currently researching other third parties that may allow a slightly higher rate of contamination

in order to have student facing organics collection (T. Haagsma, personal communication, January 28, 2021).

Currently, students may choose to use the organic composting digesters that are scattered around campus grounds (Appendix 2). The digesters are large black plastic domes that are positioned outside with the bottom of the bin open to the ground for natural decomposition to occur, but if contamination is found the organics will be sent to the landfill (T. Haagsma, personal communication, January 28, 2021). There are twenty digesters across the Keele Campus that can be located by using the sustainability feature on York's interactive campus map (York University, 2021e). The digesters that students are expected to use are maintained by Facility Services and are generally emptied twice a year (T. Haagsma, personal communication, January 28, 2021). As a personal anecdote, I have never utilized the outdoor organics digesters and neither did any of my close peers in the department because there was some confusion, lack of education on the proper use, and we did not believe it to be reliable or maintained. I would rather take my organics home with me than take the chance of possibly using the digester incorrectly. This serves as evidence that there is either a need for expanding education for students on the existing organic digesters or to switch to organics collection.

There is a project that seeks to expand upon the current organics management by implementing a community compost centre (Simoulidis, 2019). This project was approved in early 2020 and seeks to create a community composting centre that would operate as a closed loop system, using organic material from campus waste and creating usable compost for campus gardens, all while operating without the need for third party collection or processing service (Simoulidis, 2019). A community-based project like this is effective when there is involvement and support from community members and can result in pro-environmental behaviour (McKenzie-Mohr, 2000). Due to the ongoing COVID-19 pandemic, implementation of this project has been delayed (J. Simoulidis, personal communication, February 10, 2021). The scale of this project and whether it will be broadly available to accept all of the campus' organics is yet to be determined.

Financial

York spends about $350,000 annually on all waste management services (T. Haagsma, personal communication, January 28, 2021). The cost of recycling hazardous items that are not

accepted in the typical waste streams of landfilling and recycling are built into the cost of the items and their disposal does not affect the annual cost of waste management for York (T. Haagsma, personal communication, January 28, 2021).

York Food Services provides 40% of food sales on campus, while the remainder is represented by multiple private entities (T. Watt, personal communication, January 27, 2021). This division of Food Services spent $74,637 purchasing single use plastics in the 2019 calendar year (T. Watt, personal communication, January 27, 2021). As detailed below, the other 60% of food services represents multiple private entities, and it was not possible to get the data on the cost of single use plastics. However, based on the spending rate of Food Services, I estimate that the remaining private entities on campus spend about $112,000 on single use plastics, totalling about $187,000 spent on single use plastics for all of Food Services on York's campus. This number is an estimate under the assumption that both divisions of food sales use single use plastics at the same rate. Further research is required to calculate the exact amount spent annually on single use plastics.

Operations

York uses Green For Life Environmental Inc. (GFL) for waste pickup and processing (T. Haagsma, personal communication, January 28, 2021). GFL collects both waste and recycling and sends the waste to landfills in Michigan, while the recyclables are sent to Canada Fibers Arrow Road facility (T. Haagsma, personal communication, January 28, 2021). This reliance on a foreign entity to use their land to dispose of our waste is less than ideal, certainly if under precarious foreign relations. There is precedence now for a country to stop accepting waste, ever since China's National sword policy sent shock waves through the waste management system in 2018 by ultimately refusing all international recyclables (Bula, 2018).

The Canada Fibers Arrow Road facility is a single-stream Material Recycling Facility (MRF) and is the largest of its kind in North America, accepting both residential and IC&I recyclables (Canada Fibers Ltd, 2013). A single-stream recycling system does not require users to sort their recyclables before disposal, thus increasing participation and reducing the cost for collection (LeBlanc, 2020). However, the use of a single bin for all recyclables increases the chance of contamination and increases the cost of processing (LeBlanc, 2020).

To find out what is recyclable on campus, students can refer to stickers on the bins to see a simple pictogram of what is accepted in each of the tri-bins (Appendix 1). The York website currently does not state what is accepted in the on-campus recycling bin, nor does it have further clarification of what is accepted in the recycling bin beyond the simple pictogram. The fact that there is missing information may be due to the ongoing rebranding of the website. Whether this is the case or not, it shows the importance of completing regularly scheduled waste management studies as to ensure vital information is available for students. Knowing what's recyclable on campus is important for reducing contamination and increasing diversion rates. For more detailed information on recycling specific items, students can follow the same guidelines as the City of Toronto and utilize the Waste Wizard as a resource (City of Toronto, 2017).

As mentioned previously, Food Services of York is comprised of two different divisions, the private or third party run sector and the sector operated by York (T. Watt, personal communication, January 27, 2021). The York operated side of Food Services is managed by Aramark and represents about 40% of all food sales (T. Watt, personal communication, January 27, 2021). The other 60% of sales is by private businesses, each being their own entities with their own separate management and rules, which York has limited control over (T. Watt, personal communication, January 27, 2021). This division of management could make things challenging for the upcoming single use plastic ban. Although the ban is a federal mandate and all parties must observe the ban, York has limited say in how these third-party food vendors comply and whether they will provide alternatives that are more sustainable.

York's Waste Data

An annual waste audit of York's main Keele Campus was completed by Green for Life in accordance with O. Reg. 102/94 (McAlpine, 2020). The audit was completed in early 2020, just before the COVID-19 pandemic lock down and reflects typical campus usage and resulting waste (McAlpine, 2020). The waste audit collected data over a three day period and analyzed the data to estimate projected annual totals of waste in each waste stream (McAlpine, 2020). The data shows that York generates 3,765,928.30 kg of waste annually, of that 2,409,158.30 is diverted and recycled, as shown in Table 1 (McAlpine, 2020). Therefore, York's reported waste diversion rate for 2020 is 63.97% (McAlpine, 2020). This waste diversion rate is higher than the

60% recommended by the Ontario Ministry of Environment and Climate Change (SDK Environmental Consulting and Services, 2018).

Table 1 York's annual waste generation 2020

	kg
Landfill	1,356,770.00
Diverted	2,409,158.30
Total Waste	3,765,928.30

The breakdown of York's annual waste is 91,560kg of landfill waste, 1,265,210kg of unaudited residue, and 2,409,158.3kg of recycled material, with the resulting percentages shown in Figure 1 (McAlpine, 2020). Residual waste is defined by Green For Life as, "all material that cannot be diverted in any way with the current program, and thus must be disposed of via the garbage stream. This includes any materials that cannot be reused or recycled" (McAlpine, 2020). Thus, unaudited residual waste is residual waste that was not able to be identified or categorized by material in the auditing process. Out of the nonrecyclable material on campus (landfill waste and unaudited residue), 94% is represented by unaudited residue (McAlpine, 2020).

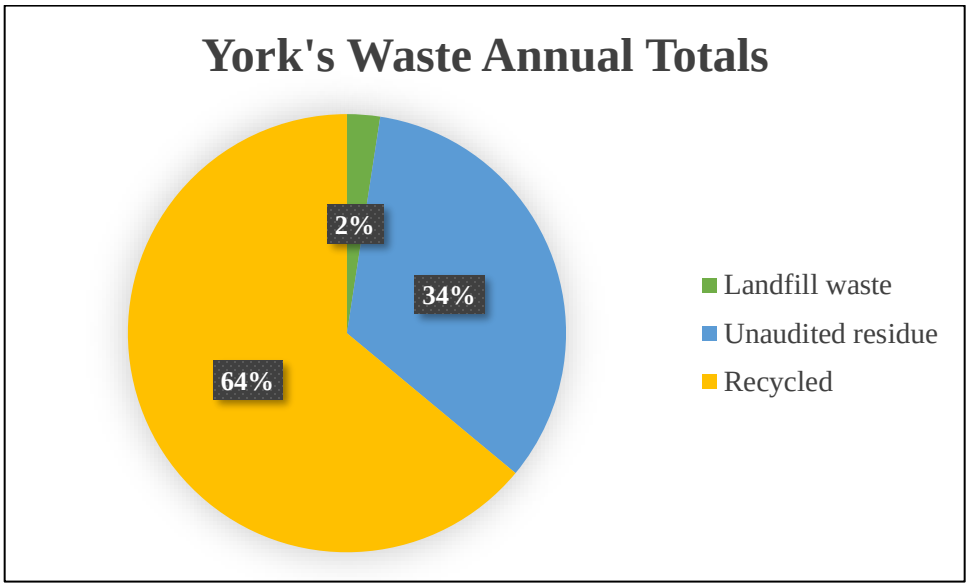

Figure 1 York's Annual Projected Waste Stream Totals 2020

York collects its trash with a front end truck and then compacts it in the larger collection bins, which either leads to much of the items being compressed beyond recognition or

contaminated by food waste (L. McAlpine, personal communication, March 9, 2021). This method of waste collection explains why there is such a significant percentage of unaudited residual waste. The materials considered as unaudited residue were bound for the landfill regardless of if they were recognizable or not, as they were already placed in the garbage bin. However, if York had a different collection method that didn't compress the waste and the materials were identifiable, it might change the data and results of the waste audit in terms of the composition of the waste. It is not possible to know the difference this would make in the results of this waste audit, but it does make one question the usefulness of completing a waste audit when a large proportion of the waste is beyond recognition. The difference the unaudited residual waste has on the waste audit cannot be calculated but considering that 94% of trash was unaudited must affect the results. This is a key limitation, and I will draw attention to the specific data that is affected by this.

Another limitation of this waste audit is that data collection occurred over a 72 hour span, but the data must be annualized from this short time period (McAlpine, 2020). There are many assumptions that go into annualizing or modelling data based on three days of data collection. There is no way to calculate how much error is within each of the assumptions. Although they follow certain guidelines, the auditing company states that they cannot guarantee the accuracy of day-to-day waste generation by material based on their annualization numbers (McAlpine, 2020). We must look at these annualized numbers as assumed projections rather than absolute numbers.

Figure 2 shows the total amounts of each material found in the waste audit. The data from audited waste shows that nearly 80% of the waste is comprised of divertible material (McAlpine, 2020). The divertible material found in waste can also be characterized as contamination, as it is recyclable material that does not belong in the waste stream (McAlpine, 2020). Out of this divertible waste, 63% of the divertible material is organics, with the other materials' break down shown in Figure 3. The percentage of divertible materials is an example of data that would be affected if the unaudited residual waste had been identifiable. Thus, the percent of divertible materials is not an exact representation of York's total waste because it does not (and cannot) account for the unaudited residual waste.

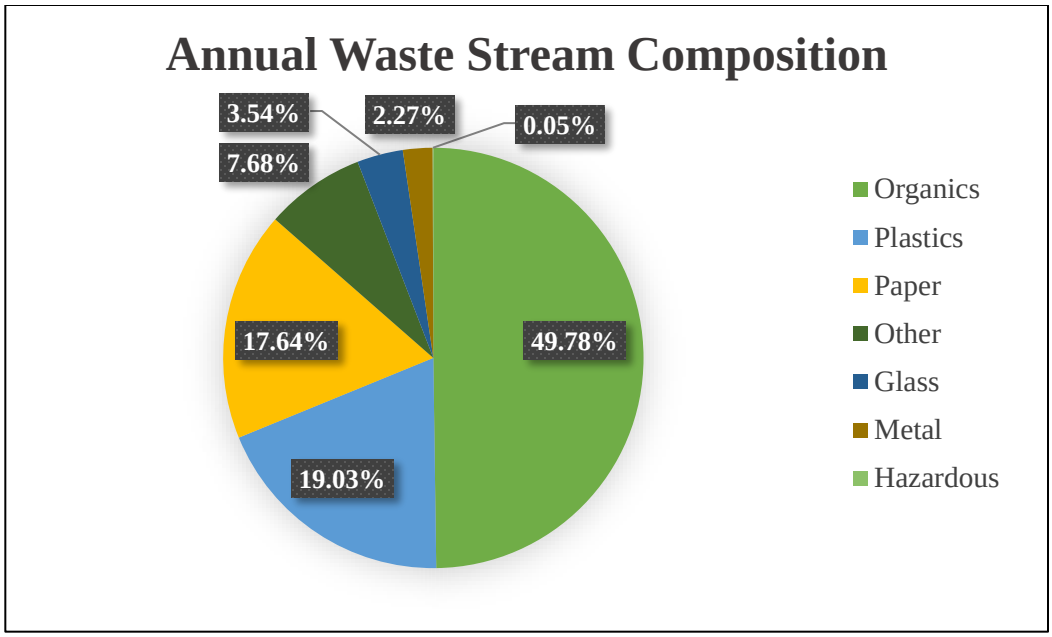

Figure 2 York's Total Annual Waste Stream Compositions of Landfill Waste 2020

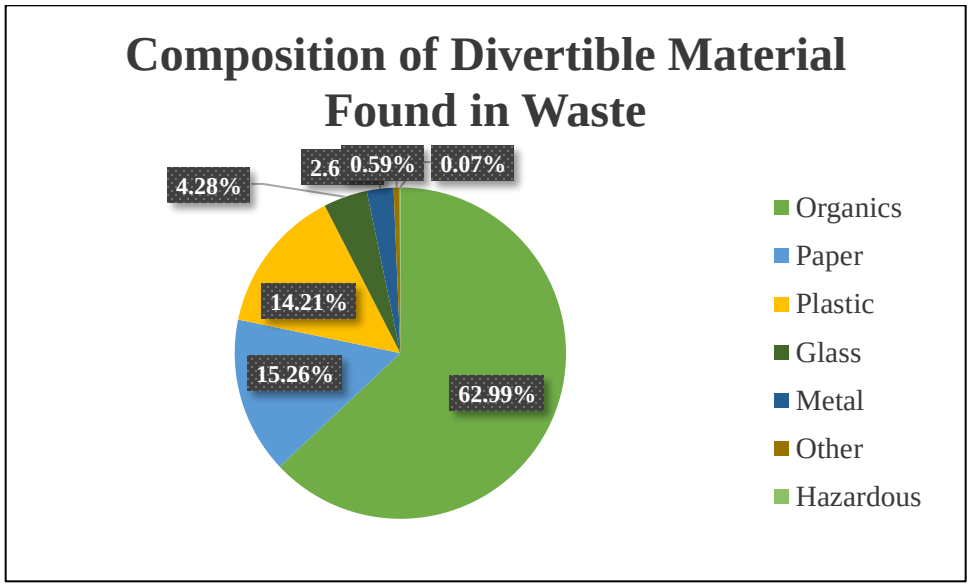

Figure 3 Divertible Material found in Waste; recyclable contamination found in landfill waste

A waste diversion index calculates how much waste is thrown away in a year per person (McAlpine, 2020). This calculation is important because it puts our waste output into perspective on the individual level. Rather than simply recording a large total annual weight that could be difficult to grasp, the waste diversion index allows one to see a more relatable number. York's Waste Diversion Index is 24.46 kg of waste per student, based on the 55,000 active full time

students (McAlpine, 2020). Communicating this information is not meant to put blame on the individual, rather it allows us to look at the data in multiple ways and gives a more robust understanding of York's waste system. Another benefit of reporting additional data is that this calculation of waste generation per person is not affected by the unaudited residual waste.

Analyzing waste data over the years gives us insight into whether our waste management is improving or not. The previously mentioned study by IRIS reported on the state of York's waste management while also completing a student survey to determine waste behaviors, attitude, and knowledge (Esseltine et al., 2010). The study was completed prior to the implementation of the ZeroWaste Program and reports on waste data dating back to 1987, recording both waste and recycling generated (Esseltine et al., 2010). The same equation that Green For Life uses to calculate the waste diversion rate is used here.

Landfill Waste + Recycling = Total Generation

(Recycling / Total Generation) * 100 = Waste Diversion Rate

Figure 4 shows the results of the calculation and indicates that the waste diversion rate has steadily increased since the implementation of a recycling program in 1991. The data also shows a bump in the waste diversion rate in 2005 when the tri-bins were installed on campus (Esseltine et al., 2010; T. Haagsma, personal communication, January 28, 2021).

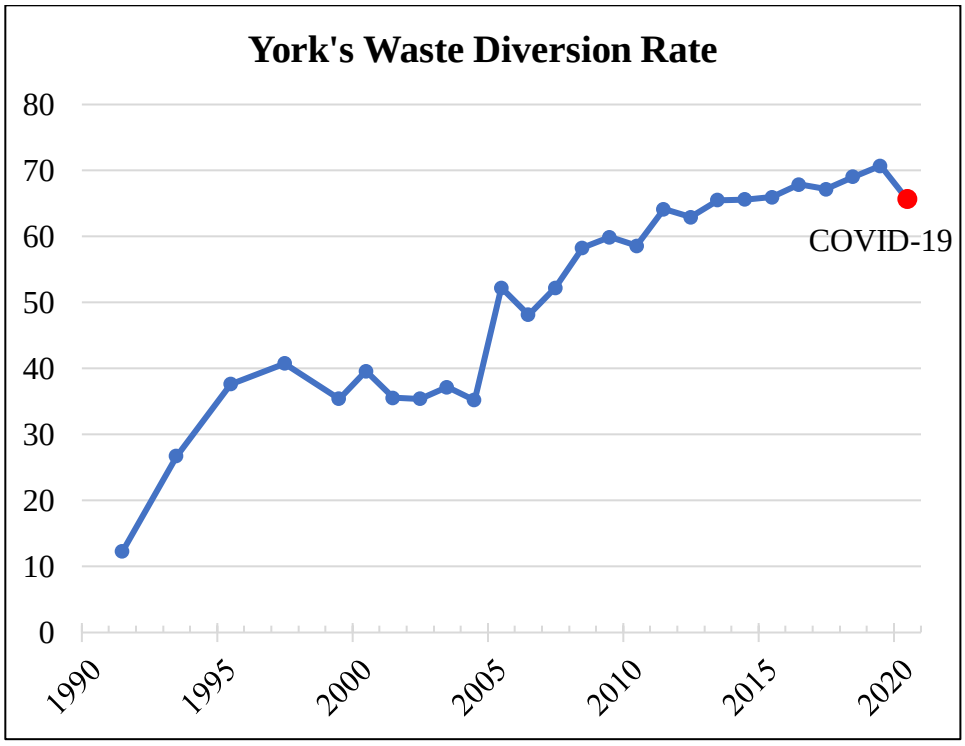

Figure 4 York's Waste Diversion Rate, calculations based on data from Esseltine et al., 2010

Since the enactment of the ZeroWaste Program in 2010, there is a trend that our waste diversion is increasing, as shown in Figure 4 (York University Facilities Services, 2020). However, the 2019-2020 school year sees a notable decrease in waste diversion from previous years. This is an anomaly likely due completing the audit at the onset of the COVID-19 pandemic. Determining what causes this decrease in waste diversion during a pandemic is outside the scope of this study but is an interesting topic that should be explored further. Whether this trend of decreased waste diversion will continue when on campus learning returns remains to be seen.

In terms of single use plastics, it is not possible to say how much York's campus creates based on the waste audit data that is currently available. All that can be said is that the category of plastics makes up 19.03% of York's waste, the second highest category (McAlpine, 2020). The waste audit doesn't detail how much of that is single use plastic, but instead it divides plastic by their plastic resin code (McAlpine, 2020). Depending on what single use plastic is being addressed, they can fall into different resin codes like #1, 4, 5, or 6 (American Chemistry Council, 2021). For example, plastics with resin code #5 are polypropylene, which can be containers for takeout meals, medicine bottles, and bottle caps (American Chemistry Council, 2021). York's waste audit shows that plastic #5 is the largest category of plastic found on campus (McAlpine, 2020). Although we cannot say with certainty how much of this is made up of single use plastics like food takeout containers, it is an area that can be focused on.

Comparison to other Universities

York University is located in Toronto, Ontario, a highly multicultural city of 3 million people (Government of Canada, 2019). The diversity of Toronto creates unique social and cultural norms. Because of this I will compare York's waste management and waste diversion to other universities in Toronto, rather than compare York to similar sized universities across Canada. The Toronto universities to be compared here include the University of Toronto (UofT) and Ryerson University (Ryerson).

When comparing data produced by different organizations, it is important to note any possible limitations. While these waste auditing organizations used by the three Toronto universities being compared here all followed the same provincial guidelines for auditing, there are still factors that should be noted that go beyond the data collection process (McAlpine,

2020). UofT and Ryerson are both centrally located in downtown Toronto. Their highly central locations allow for a steady flow of public pedestrians to access the campus and thus its waste receptacles. It is not infrastructurally feasible for UofT or Ryerson to have trash cans that are only accessible to their student body, so waste from the public is unavoidable. Therefore, UofT and Ryerson's waste audits cannot accurately represent just the student body's waste amounts and will be "contaminated" with the public's waste. York differs from these schools by being more removed from downtown and not as centrally accessible to public pedestrians.

Although these schools do differ in their accessibility to the public, we can still compare their waste data. All three waste auditing companies used follow the same guidelines for auditing laid out by the Ministry of Environment Ontario in O.Reg. 102/94 (McAlpine, 2020). According to O.Reg. 102/94, all waste audits must address how waste is produced and managed and identify the amount and composition of waste generated (McAlpine, 2020). Thus, a comparison between the three universities is possible since they are all following the same auditing procedures.

The University of Toronto has a slightly larger student body than York, with about 60,000 active students (SDK Environmental Consulting and Services, 2018). UofT's waste audit was completed in the Winter of 2018, before the COVID-19 pandemic and represents normal campus usage and resultant waste (SDK Environmental Consulting and Services, 2018). UofT's waste diversion rate is 67%, which is higher than the 60% objective set by the Ministry of Environment and Climate Change (SDK Environmental Consulting and Services, 2018). The percent of recyclables found in UofT's waste is 72.5%, much of it comprised of paper towels, organic food waste, plastic films, and coffee cups (SDK Environmental Consulting and Services, 2018). The annual quantity of waste disposed per student is 33.70 kg (SDK Environmental Consulting and Services, 2018). This is much higher than York's student waste production, which is 24.46 kg per student (McAlpine, 2020).

Ryerson University has a smaller student body than York, with 36,503 full time students (Waste Reduction Group Inc, 2018). Ryerson's waste audit was completed in the Summer of 2018 before the COVID-19 pandemic and should represent regular campus usage and waste (Waste Reduction Group Inc, 2018). It is important to note that Summertime usage of campus is inherently lower than during the regularly scheduled school year. But the organization completing the waste audit either accounted and normalized for this or did not think it would affect calculations. Ryerson's waste diversion is 40%, which is much lower than the province's

recommended 60% and the lowest out of the three schools being compared here, as shown in Table 2 (Waste Reduction Group Inc, 2018). The percentage of recyclables found in Ryerson's waste was 67.2%, with the audit sample consisting of organics, paper towels, scrap metals, and plastic films (Waste Reduction Group Inc, 2018). A compost program exists in some areas of Ryerson, including for residences (Waste Reduction Group Inc, 2018). If we follow the same Waste Generation Index equation Green for Life uses for York, we can find the amount of waste Ryerson generates per person each year.

Total Material Generated / Total Persons on Site = Waste Generation Index

Based on Ryerson's 36,503 full time students, Ryerson creates 26.32 kg of waste per person each year (Waste Reduction Group Inc, 2018).

Table 2 Waste Management Data Comparison of Toronto Universities

	York University (2020)	University of Toronto (2018)	Ryerson University (2018)
Total Waste to Landfill (kg)	1,356,770	2,064,500	960,920
Waste Diversion Rate (%)	64	67	39.9
Recyclables in Waste (%)	79.03	72.5	67
Waste Generation per person (kg)	24.46	33.7	26.32

Discussion

While York has a waste diversion rate higher than the province's recommendation, UofT has a slightly higher rate at 67% (SDK Environmental Consulting and Services, 2018). York also has the highest percentage of recyclable material found in our waste compared to the other universities. This higher contamination rate shows that there is room for improvement at York. Recycling properly would lower the recyclable contamination found in waste while simultaneously increasing our waste diversion percentage. York's waste generation per person is

the lowest out of the three universities being compared here. Simply looking at waste diversion would not have given us this more robust understanding that we have now.

The general focus on waste diversion in waste management prompts people to want to divert and recycle as much as possible. However, this inadvertently encourages wish-cycling, an informal term for placing items in the recycling in hopes that it could be recycled without properly researching if it is recyclable (Domtar Newsroom, 2019). Ultimately, this aspirational recycling by individuals leads to contamination of the recycling bin and sends viable recyclables to the landfill. This well-intentioned act of increasing diversion actually decreases waste diversion by sending more materials to the landfill in the end.

The emphasis on waste diversion also encourages recycling rather than waste reduction. Recycling cannot be the emphasized solution for waste management, as it has many downfalls (Jarvis & Robinson, 2019). If we follow the principles of the 3 R's, otherwise known as the waste hierarchy, "reduce" is the first and most preferred step over reuse and recycle (Environment and Climate Change Canada, 2010). Rather than focus primarily on waste diversion, waste management must look at the whole system to better understand how to manage waste. This is where the more detailed Zero Waste Hierarchy can also be useful, as it places "Rethink/Redesign" as the most important and first step (Zero Waste International Alliance, 2018). Thus, when comparing these Toronto universities' waste data, it is important to look at more than just waste diversion rates.

Single use plastic ban

Single use plastics are plastics that are intended for one time use and then disposed of, often used out of convenience. The Great Canadian Shoreline Cleanup, a national volunteer led effort to pick up litter, documents the commonly found items or "Dirty Dozen," much of which are single use plastics (Great Canadian Shoreline Cleanup, 2019). The federal government announced a proposed ban of certain harmful single use plastics in 2019 as a way to combat plastic pollution (Trudeau, 2019). The criteria that the government used to select harmful plastics to be banned were if the plastics are often found in the environment as litter, rarely recycled, and have alternatives readily available (Environment and Climate Change Canada, 2020). Under these criteria, plastic checkout bags, straws, stir sticks, six-pack rings, cutlery, and hard to recycle food wares were selected to be banned by the end of 2021 (Environment and Climate

Change Canada, 2020). The government asserts that if we improve the way we manage our plastic waste, it could create 42,000 jobs and reduce the nation's annual greenhouse gas emissions by 1.8 million tonnes (Environment and Climate Change Canada, 2020).

In the context of single use plastics, there are two policy instruments that have been used to reduce waste, regulatory and economic instruments. Economic instruments like a levy or tax on single use items have been used before, like the 5 cent tax on plastic bags in the City of Toronto (City of Toronto, 2012). But this tax has since been removed and retailers are no longer required to charge 5 cents for single use plastic bags, but can still choose to if they want (City of Toronto, 2012). These economic instruments put the burden on the individuals, and it does not penalize the producers. Strictly using economic policy instruments also gives the impression that if you can afford it, then you are allowed to consume plastics and pollute. This is not the ideal approach and is not the right messaging the public should take from these policies.

A regulatory instrument like a ban sends a stronger message: there is no place for these single use plastics. However, the single use plastic ban is a regulatory instrument that continues to place the responsibility on the individual consumers rather than the system of producers. Under the ban, individuals will either use their reusable items, which would contribute to the circular economy or use single use alternatives, which perpetuates the linear economy. This does little to challenge the treadmill of production, as single use alternatives will continue to be produced (Gould et al., 2004). This continued production of single use alternatives goes to show that a regulatory instrument like a ban can still have an economic effect.

The goal of the single use plastic ban according to the federal government is to reduce waste going to the landfill and reduce waste as litter (Environment and Climate Change Canada, 2020). But is a ban of six items that represent less than one percent of all plastics going to be effective (Tunney, 2020)? The ban is still in its formative stage but as it stands now, it does little to address environmental impacts because it represents such a small proportion of total waste. Not only that, single use alternatives will be produced and consumed. The ban of one item will lead to the production of another. Although the ban targets such a small and precise category of plastics, it is still a regulatory attempt at the federal level to limit our impacts on the environment. Thus, it is worthwhile to study, especially when it pertains to the effects it can have on the young minds of students.

York's Infrastructure and the ban

The single use plastic ban has six items, most of which are connected to the food service industry (Trudeau, 2019). With York's Food Services divided into two different sectors with different management, the single use plastic ban may be realized in different ways. Plastic is the second highest contributing material found in York's waste, as it represents 20% of York's waste, or over 17,000kg (McAlpine, 2020). The waste audit does not go into detail of how much of that is represented by single use plastics. Thus, it is not possible to say what the waste diversion impact of the single use plastic ban will be for York's campus. If single use alternatives are used, waste diversion may not be impacted at all. This supposition is based in the fact that the banned items are designated as waste and are not recyclable. Available single use alternatives to these items are likely to be non-recyclable materials as well. Accordingly, it would be an even trade in terms of number of items going to the landfill and would have no effect on waste diversion.

However, the ban may be the necessary social motivation for students that will bring about environmental awareness and positive change. In turn, this could motivate students to bring reusable alternatives, thereby reducing their consumption of single use plastics and other single use materials. In this way, the ban has the potential of increasing waste diversion. I will survey students using the Theory of Planned Behaviour to determine this and other waste related behaviors.

Survey

To understand the behaviours of York students around waste, I conducted a survey for two weeks to determine beliefs surrounding single use plastic use and composting on campus. This survey was only open for current York University students, as it is their response I was concerned with because the goal is to create accessible educational material about waste management at York for students, by students. The survey was solely conducted online via Google Forms due to current COVID restrictions. Because of these restrictions, I didn't have the traditional opportunities a student researcher would have to promote the survey on campus. So, I partnered with the Office of Sustainability to get the survey approved and endorsed by the University. The University promoted the survey on the "This Week @ York" weekly email that

is sent to all students. This elicited 94 responses to the survey, 5 of which were students that live on campus.

The survey was divided into five sections: ethics consent form, demographic questions, single use plastics, composting, and downloadable education material. The single use plastic and composting sections will be the focus here. The questions were based in the Theory of Planned Behaviour to determine students' behavioural, normative, and control beliefs as shown in Figure 5 (Ajzen, 2019). In other words, it was determining their attitude towards a behaviour, subjective norms, and their perceived behavioural controls (Ajzen, 2019). These factors contribute to a person's intentions and whether they are acting on those intentions, i.e. behaviour (Ajzen, 2019). According to the Theory of Planned Behaviour, perceived behavioural controls are a key factor in predicting behaviour (Ajzen, 2019). Therefore, this survey set out to determine students' perceived ability of reducing single use plastics or composting on campus. The questions were asked in either Likert scale or multiple select with optional fill in the blank.

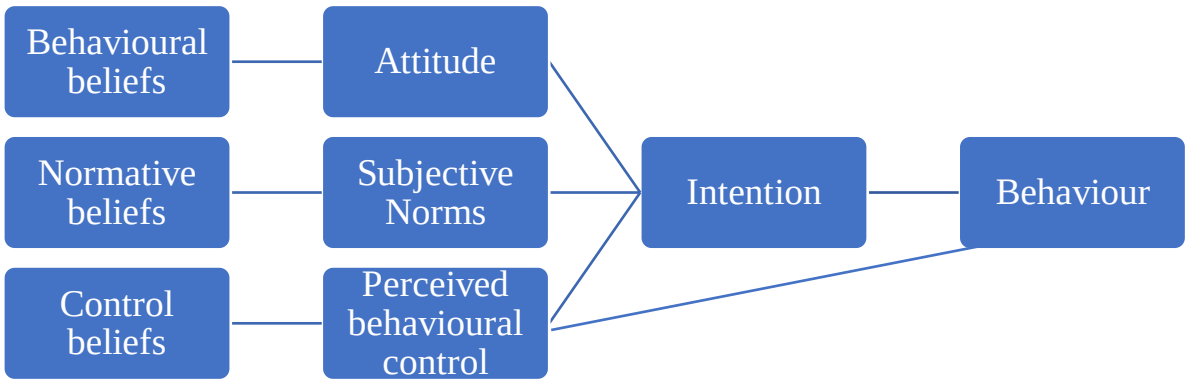

Figure 5 Theory of Planned Behaviour (Ajzen, 2019)

Survey Results

The survey elicited 94 student responses, a majority of which were in the Department of Environmental and Urban Change. Students were asked questions surrounding single use plastics and composting on campus. In the single use plastics section, most respondents, and the people

around them believe reducing single use plastic is important. Most respondents intend to and have tried to reduce single use plastics on campus in the past. But most respondents disagree with the statement “Most students at York University limit their use of single use plastics.” Most students agree that reducing single use plastic consumption involves more than their individual choice. Most students see remembering and carrying around reusable alternatives as a hassle. 99% of students see reduced landfill waste as an advantage of reducing single use plastics. In general, more students responded with advantages of reducing single use plastics rather than disadvantages. Most respondents agree that a reusable take-out program would make it easier to reduce their single use plastics on campus.

In the composting section, most respondents, and the people around them agree that composting is important. Most respondents compost at home and intend to compost on campus. But most respondents have not composted on campus in the past and do not know where the composting bins are on campus. Additionally, half of the respondents are confident in knowing what goes in the composting bins while the other half are not confident. Most respondents are not confident that they are able to compost on campus. 90% of respondents agree that added locations of composting bins would make it easier for them to reduce their organics waste while on campus. 91% of respondents list not knowing the location of composting bins as a factor that makes is difficult for them to reduce their organics waste while on campus.

The multiple-select questions had an optional fill-in-the-blank response if students wanted to write in their own extra option. I thematically coded the fill in the blank responses and the analysis revealed that the common major themes are a change in campus operations, increased education, personal reasons, and organics. Other minor themes are producer responsibility, environmentalism, and miscellaneous responses. Within these main themes were subtopics, as shown in Table 3. The key findings and summary of all of the survey results is shown in Table 4.

Table 3 Survey Results Thematically Coded

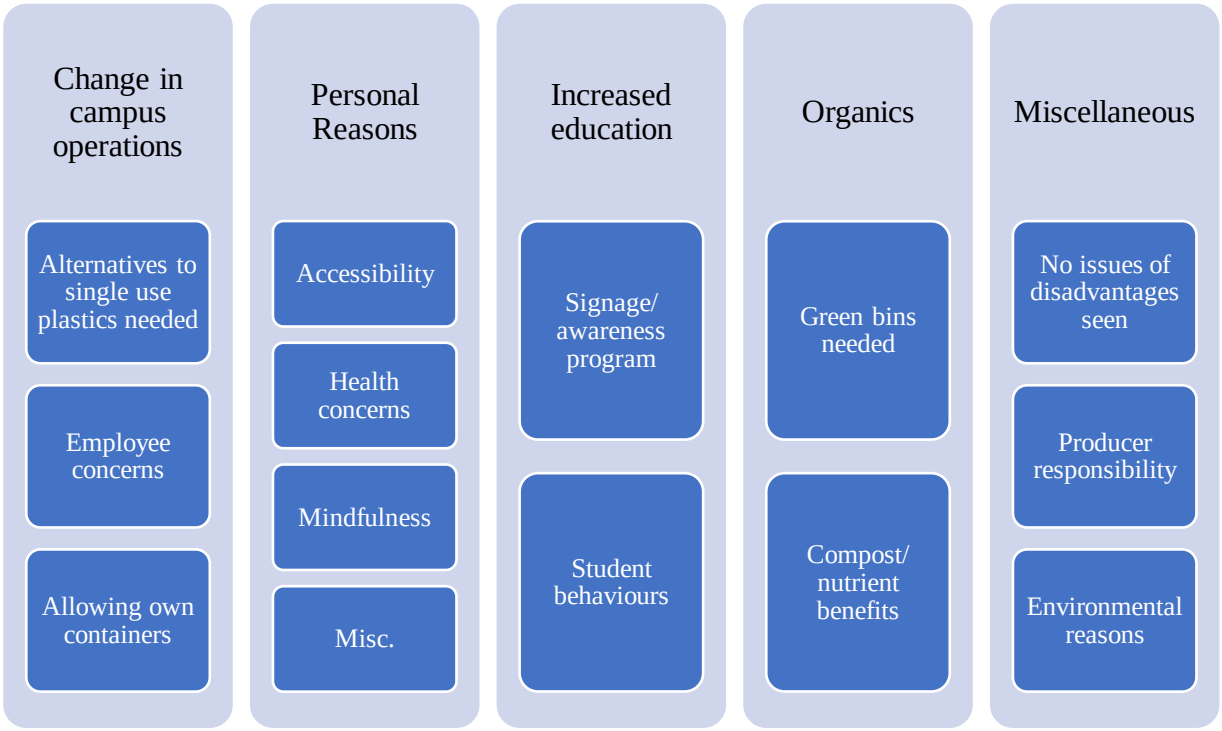

Table 4 Survey Results Key Findings

Survey Results Key Findings	Most students agree reducing their single use plastics is important and they try to reduce while campus. But they do not think other students reduce their single use plastics while on campus.
	Most students want to compost on campus but most do not know that there are composting bins, they do not know where the bins are located on campus, and they do not know what goes in the bins.
	Students want to be able to use their reusable containers, they do not want single use plastic to be the default option, and they want more education and awareness about waste.

The analysis of the survey's results illuminates the need for York to reconsider some of their operations. Within the theme of a change in operations, the subtopics are allowing one's own containers, the need for alternatives or moving away from single use plastics as the default

option, and a change for employees. Some students suggested increasing the number of employees tasked with waste management and giving employees the sorting role rather than having students continually mis-sort their waste. This method of having a main collection point that is constantly staffed is used in some food courts (Urback, 2011). Although this may increase diversion and reduce contamination of the waste streams, it does not educate students on proper waste management for them to be able to make well-informed choices in the future beyond campus life. Any changes that are made to campus operations should be changes that are sustainable, not just in terms of being beneficial for the planet but also to be able to maintain the changes.

This dichotomy of students thinking they themselves are reducing single use plastics on campus but their peers are not reveals an interesting finding. The individual sees themselves as trying but they do not think the collective whole is trying. There are many potential reasons this could be. For one, most of the respondents were from the Faculty of Environmental and Urban Change. Thus, they are more likely to be environmentally minded and engage in more environmentally beneficial behaviours. Another reason is that there are systems in place to make us believe that our individual actions are more important or effective than collective actions. Producers within capitalism want consumers to believe that their individual action is what's important. The pressure to make greater environmental change is on the individual. But collective action or collectivism is about sharing duties and obligations towards a shared goal (McCarty & Shrum, 2001). If students are influenced by this type of individual over collective thinking, then this can likely explain this dichotomy.

There are both internal and external factors that contribute to pro-environmental behaviour (Kollmuss & Agyeman, 2002). The pro-environmental behaviours that we are encouraging here are reducing single use plastics and composting. While York does not have control over every single internal and external factor, York can focus on the ones they do have influence over. These include the external factor of infrastructure and the internal factor of knowledge (Kollmuss & Agyeman, 2002).

Recommendations

York is working towards meeting the United Nations Sustainability Development Goals, which outlines seventeen different objectives (York University, 2021d). The objectives that

relate to waste management are number nine industry, innovation, and infrastructure; number eleven sustainable cities and communities; number twelve responsible consumption and production; number thirteen climate action; and number fifteen life on land (York University, 2021d). York also has the President's Sustainability Strategy that uses a three pronged approach towards sustainability: people, knowledge, and place (York University, 2017). But York must decide how these broader goals specifically translate to waste management. Are we trying to achieve a zero waste, plastic free, or a carbon free campus? Once York determines its specific waste goals, that will govern the methods moving forward. In an ideal world, the goal is that the university has perfect diversion numbers and that there is no contamination in any of the waste streams. This is the goal I will be basing these recommendations on, which are outlined in Table 5.

The focus of this research was initially going to be on single use plastics, especially when looking through the context of an impending national ban. But based on the data from the waste audit, organics waste cannot be ignored. I recommend that organics waste should be a main focus looking forward, as it makes up 50% of York's landfill waste (McAlpine, 2020). Some ways to focus on organics waste diversion would be to bring greater education and awareness about the presence of composting bins. Students should be educated on the fact that they have access to composting bins, where they are located, and what can be thrown in them (Appendix 4). An educational campaign that focuses on the positive impact we can make together as a community, rather than pointing fingers at individuals is the inclusive messaging that should be employed.

In terms of single use plastics, the data is not concise enough to make specific recommendations at this time. Further research on the contributions single use plastic makes on York's overall waste numbers is recommended. This would involve factoring in single use plastic as a category in future waste audits. Determining the baseline amount of single use plastics used will allow the school to assess the effectiveness of future sustainability initiatives. Upon the return of on campus learning, it is recommended that reusables should be allowed and encouraged.

There is an opportunity for more streamlined education on York's website. Access to information about waste on campus should be clear and easy to find. The current website has waste related information in two separate sites, Facility Services and The Office of Sustainability

(York University, 2021a, 2021d). There should be one central location on York's website with accessible information about waste. This information should include the what, where, and why's- what to compost and recycle, where to compost and recycle, and why we should compost and recycle.

The current waste audit method only audits waste that is destined for the landfill. I recommend the auditing process should additionally include the recycling stream. York may be diverting 63.97% of waste away from the landfill, but how much of that is actually recyclable material? Recycling is susceptible to being contaminated with nonrecyclable material. An audit of the recycling stream would reveal the level of contamination, essentially illuminating how effective we are at recycling.

I recommend that the university rethink the collection method that compacts the trash. This method does not allow for accurate waste auditing information by compacting the materials beyond recognition and could be skewing our audit numbers (L. McAlpine, personal communication, March 9, 2021). It is important to have data that accurately reflects how much waste the campus is creating so that York can make informed decisions for future waste management.

Table 5 Recommendations

Recommendations
Outline clear and specific waste management goals and the methods that will be engaged to work towards those goals.
Increase organics diversion by greater education on the location of composting bins.
Create one central location online for information about waste management that uses accessible language for all students.
Allow reusables once COVID protocols allow and shift away from single use plastics towards more sustainable material or reusables.
Include single use plastics as well as the recycling stream as categories in future waste audits.

Conclusion

Waste at York and waste management in general is a complex topic with many avenues with which to analyze. While all of this data was already available, it is important to amalgamate it into one accessible document. Gathering this data is important for looking towards the future of York's waste management and sustainability and aligns with the goals of the University Academic Plan and its mission to advance the United Nations Sustainability Development Goals (York University, 2020). The data revealed that organics waste is a key area that will need focus, becoming an added section in my survey to students that I had not originally intended. The inevitable single use plastic ban will be realized in different ways, due to the different managements of Food Services at York. A common theme that the survey results showed is that students want to make sustainable changes towards waste on campus but do not know about the services and infrastructures that are already in place to successfully divert waste. The survey revealed that students want to compost on campus but do not know where the bins are located. The survey also revealed that students want to be able to use their reusable containers and they want options other than single use plastics offered to them while on campus. It is my recommendation that York creates accessible education material to bridge this gap in knowledge about the campus' existing waste infrastructures. York must set clear and specific waste management goals that are informed by these survey results, as it is a representation of the students' behaviours and ideas surrounding waste.

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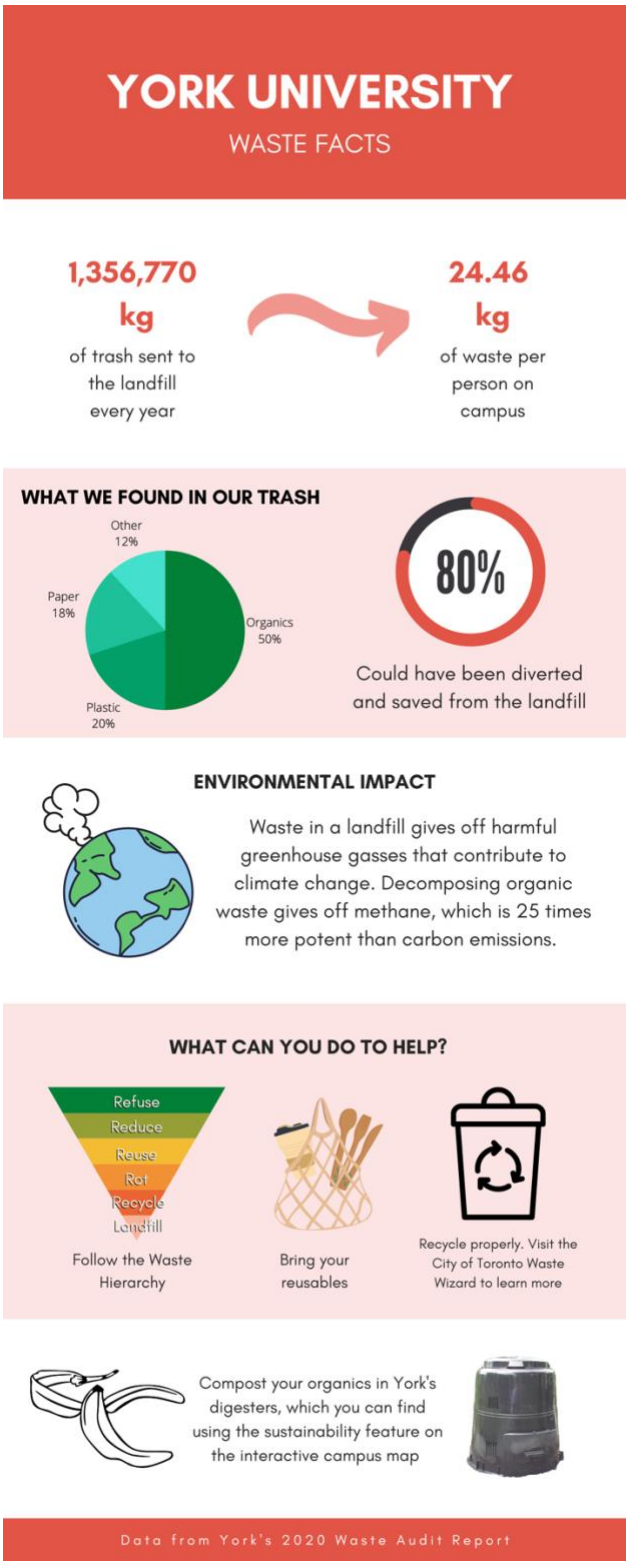
Appendices

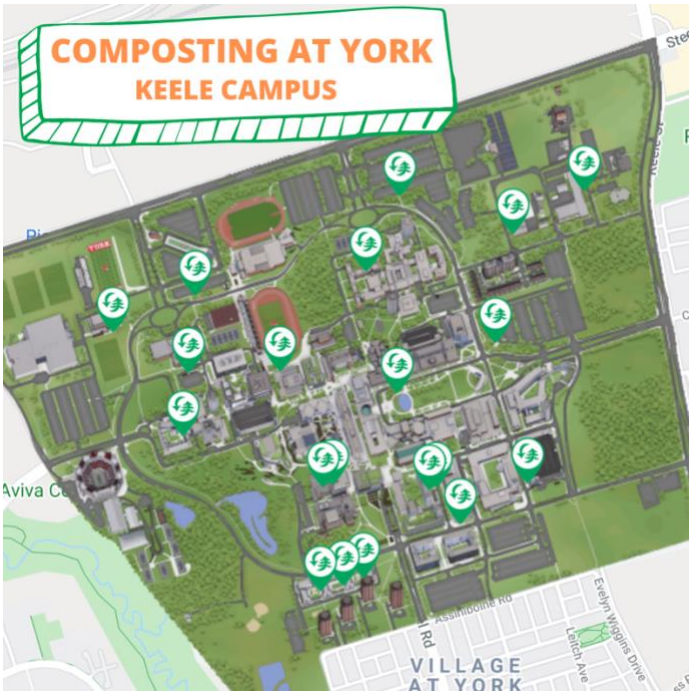
Appendix 1: Photo of Tri-Bins on campus with the standard stickers that have pictograms of what is accepted in each bin. Photo credits to Tim Haagsma.

Appendix 2: Outdoor composting digesters on campus, available for students. Photo from York Branding.

Appendix 3: Environmental education material I created based on the waste data presented here. This infographic was made available to students after their completion of the survey.



Appendix 4- Environmental Education Material for Social Media on Composting


COMPOSTING AT YORK
KEELE CAMPUS
VILLAGE
AT YORK

The Single Use Plastic Ban:

Governmentality, Management, and the Responsibility of Waste

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Waste is an issue that has increasingly become part of the zeitgeist and through a discussion in this paper I will critically analyze the discourse around waste and waste management and consider how it is defined limits the exploration of more efficient management approaches and new policy. I suggest here that the single use plastic ban is a form of neoliberal governmentality dependent on the market and individual consumer to be responsible for waste management rather than an industry shift in practices. I argue that the ban does not challenge the treadmill of production, rather it is a form of precautionary consumption that fails to decouple economic growth and waste.

The federal government of Canada plans to ban six commonly used single use plastics: bags, straws, six pack rings, cutlery, plates, and stir sticks (Trudeau, 2019). The key criteria used to select what plastic items were to be banned was based on items that are not often recycled, their prevalence in the environment as litter, and the availability of alternatives (Environment and Climate Change Canada, 2020). These decisions were not based on their emissions impact, but rather their physical impact on the environment as litter. Using this criterion shows that physical pollution was a main driver in this policy decision. Canada is not using a phased approach like other countries have in the past, rather they are banning all six items at once. It is not clear whether this approach will be more effective in creating positive environmental change. But it is possible that such a significant move can be the nudge to encourage pro-environmental behaviours (Steg & Vlek, 2009).

The plans for a single use plastic ban were announced by Prime Minister Justin Trudeau on June 10, 2019 (Trudeau, 2019). Although the single use plastic ban sounds like a great environmental initiative, it is important to know the temporal context around what else was happening at the federal level. Just one week after the announcement, Trudeau's government approved the expansion of the controversial Trans Mountain pipeline (Meyer & De Souza, 2019). This pipeline transports oil extracted from tar sands, which is the most energy intensive form of oil extraction and processing. Considering these two shifts in production around energy and petroleum products, any attempts of environmental protection from the single use plastic ban will be nullified by the pipeline's expansion (Meyer & De Souza, 2019).

I am bringing these two oil related industries into conversation here because I see them as related and argue that the announcement of the ban was an attempt to distract the people from the environmental harm that results from a pipeline expansion. This could also be seen as a form of

greenwashing. Greenwashing is the process of attempting to appear more environmentally friendly than one actually is and is typically done by companies. The federal government is engaging in this type of deception by trying to appear environmentally friendly with the ban. While the world was busy applauding Canada's decision to ban single use plastics, they expanded pipelines.

To understand this dynamic further, I want to consider the reasoning and goal of the ban from the government's perspective and offer and analysis of the objectives of the ban as outlined in government reports. The government proposes that a single use plastic ban will reduce GHG emissions, create jobs, and reduce harm to the wildlife and waters (Environment and Climate Change Canada, 2020). The proposed goals of the management framework are to "eliminate or significantly reduce single use plastics entering Canada's environment, reduce the environmental impact of plastic products overall, and conserve material resources by increasing the value recovery of plastics" (Environment and Climate Change Canada, 2019).

The alternatives to the banned single use plastics will determine whether this ban will be effective in reaching its goals of reduced emissions or even reduced landfill waste. The available options are single use alternatives or reusable substitutes. If you replace plastic for single use alternatives such as biobased or compostable plastic made partially or wholly from renewable biological resources, it will be a one for one replacement and you will not reduce the number of items going to the landfill. However life cycle analyses (LCAs) have shown that biobased plastics have lower emissions and fossil fuel consumption in production (Poster et al., 2012). Thus, it would reduce the impact to atmosphere, but not necessarily the landfill. It should be noted that LCAs are notoriously inconsistent and can vary in results due to the number of factors that can be included or excluded. This does not necessarily diminish the usefulness or validity of LCAs, but it is something to be cognizant of when researching.

Plastic as pollution was emphasized in Trudeau's announcement of the ban (Trudeau, 2019). Readily available single use alternatives to these banned plastics can still become pollution. Most of the alternatives are biobased or naturally derived, so they would theoretically break down in the environment eventually. However, single use alternatives do not diverge from the relationship between economic growth and waste production, or what is known as the treadmill of production (Gould et al., 2004). Single use items continue the need for production and disposal. Reusable substitutes are less prevalent as pollution, as shown by the data from the

Great Canadian Shoreline Cleanup (Great Canadian Shoreline Cleanup, 2019). Reusable substitutes are preferred to single use alternatives in this regard of visibility.

The single use plastic ban is perplexing, is it trying to create a systemic change to decrease the dependance on plastics and petro-chemical products or is it trying to encourage individual's behaviour change? If the goal is to the change systems and eliminate single use items, then individuals would need to bring their own reusable substitutes. But this still puts the pressure and responsibility on individuals to make the change as a form of governmentality, which will later be discussed in detail. On the other hand, if you don't want to put the pressure on individuals, businesses would have to continue to offer single use alternatives. But this would not result in a systemic change, it would simply be a change in material makeup of the items. Production and consumption would not change, and it would not challenge the treadmill of production. The framework or goals of the ban are not well enough defined to determine whether it is trying to address a systemic change or individual change.

Environmental policy is key in responding to environmental issues and I am interested in what informs policy and whose interest influence policy development. The word "environment" is not mentioned in the Canadian Constitution and its jurisdiction is spread across multiple levels of government (Library of Parliament, 2019). Rather than the federal government hold all of the power in dealing with matters of the environment, power is divided among the federal and provincial governments, which is a feature of federalism (Library of Parliament, 2019). Jurisdiction is divided by specific environmental issues and is based on the subjects that are covered in the Constitution, but can sometimes overlap between federal and provincial jurisdiction (Library of Parliament, 2019). Waste management is mainly considered to be under municipal, provincial, and territorial control, but there are still some aspects of waste management that are of federal concern (Library of Parliament, 2019). Toxic substances, international movement of hazardous waste, waste management on federal lands, and federal contaminated sites are all under the federal government's jurisdiction (Library of Parliament, 2019). Federalism is meant to be a balance of powers but can lead to confusion over jurisdiction, sometimes resulting in inaction or even disputes. Uneven power relations or hegemony can weaken power, which will be discussed in a future section under the terms of waste.

The history of waste management policies is important to consider in this analysis of a single use plastics ban; understanding its path reveals that a system to deal with and respond to

waste has become an industry that produces commodity flowing within a global economy and uneven power relations that enables the exploitation of people and lands. We see this play out as waste is shipped from wealthy states to countries in the global south such as the shipment of waste from Canada to the Philippines (Kennedy, 2019). There have broadly been three main periods of waste management throughout human history. The first period was preceding the late 1800s, when individuals were locally managing their own waste (de Kadt, 1999). From the 1880s to 1970s a widespread system of collection was created as a response to growing public health concerns (de Kadt, 1999). From the 1970s to now, waste management has become an international phenomenon, in which waste is moved across borders and seas to be processed as a commodity (de Kadt, 1999). The U.S. Supreme Court even deemed waste as an article of commerce, officially making waste a capitalist commodity, which explains why Canada is able to export some of its waste to the United States (Bartkowiak Jr, 2020; de Kadt, 1999). The current period of waste as a commodity gives context to some of the waste management policies discussed here.

The Canadian government website states that municipal solid waste is a shared responsibility among federal, provincial, municipal and territorial governments (Canada, 2017). It does not mention the responsibility of individual citizens, which will be discussed in detail in following sections, but it does mention producer responsibility. Extended producer responsibility (EPR) is a policy approach where producers of waste are held responsible for the treatment and disposal of post-consumer products, in other words the end-of-life management of products (OECD, 2021). EPR is now an approach that is being used in the province of Ontario (Ontario, 2017).

In Ontario, the Ministry of the Environment (MOE) was created in 1971 in part, as a response to the growing issue of single use packaging from the beverage industry (Canadian Institute for Environmental Law and Policy, 2008). Prior to that, the beverage industry was using refillable bottles and did not produce single use packaging. But the rise of single use packaging led to a need for responsibly managing the waste and somebody to oversee it. In the 1980s, the MOE regulated increased recyclability of packaging and amended the *Environmental Protection Act* (Canadian Institute for Environmental Law and Policy, 2008). This led to calls for curbside recycling, which was opposed by environmental groups at the time because they preferred a return to the refillable system (Canadian Institute for Environmental Law and Policy, 2008). Any

opposition went unheard and the beverage industry got what they wanted, an easy pass from being held responsible for the single use packaging waste they're creating through the implementation of curbside recycling (Canadian Institute for Environmental Law and Policy, 2008). The history of the creation the Blue Bin provides important context to the way waste management is handled in Ontario; those with deep pockets, like the beverage industry have influence over legislation and some waste management practices are less green than they appear to be. The beverage industry held the power to define waste management under their terms and it did not result in a shift in the system, rather it maintained production and its resulting waste, which continues today.

Questions about jurisdiction raise questions of power and responsibility. With waste management, there is no confusion over who is responsible for picking up household waste. Municipalities have jurisdiction over household waste collection, as we can see our city's name written on our waste bins. However, the individual is still responsible for sorting out their recycling and compost from their waste. Then there are matters that are beyond the municipality or even the province, like the federal government's announcement of a ban on certain single use plastics (Trudeau, 2019). The federal government has jurisdiction over matters that deal with toxic substances and recently listed plastic as a toxic substance in 2020, thus giving them jurisdiction to make nationwide regulations about plastics (Government of Canada, 2020).

Canada is not the first country to enact a single use plastic ban, over 35 countries have put forth some sort of ban plastic ban legislation (Environment and Climate Change Canada, 2020). Kenya has banned single use plastic bags, Zimbabwe banned Styrofoam food containers, and the UK has added a tax to plastic bags (Masterson, 2020). So there is a precedent for national bans, but Canada is one of the first countries to try and ban more than one item at the federal level (Masterson, 2020). Whether this approach is more effective than a phased approach is yet to be seen but is an opportunity for a research topic in the future.

The word waste can be used as an adjective, verb, or noun. Waste can mean different things, is it something that no longer serves a purpose? Is it something that is excess or by-product? Is it something that is unusable or unwanted? Moore argues that all of the various definitions of waste fall within four categories and can be plotted along two axes (Moore, 2012). The two axes of waste can be plotted along positive or negative: easy to define or more abstract and harder to define, and they can be plotted against dualist or relational: nature and society are

separate or nature and society are intertwined (Moore, 2012). Within these four categories or quadrants, waste can be defined as a hazard, resource, non-Marxian commodity, manageable object, archive, disorder, filth, risk, fetish, governable object, actant, or abject (Moore, 2012). However, waste is dynamic and goes beyond a simple categorization (Baviskar & Gidwani, 2019).

Waste is dynamic and by defining waste there are clearer directions to guide management policies, essentially determining their effectiveness. The way you define a target implies the action upon it. If you define waste as something that already exists, then waste management is simply a reaction (Pongrácz et al., 2004). This is not a proactive approach and doesn't stop waste from being created in the first place. If waste minimization is the goal of waste management, then it is important to be cognizant of the way we define waste. An interesting thought experiment is to replace the respective definition of waste in "minimization of waste" and see if it makes sense (Pongrácz & Pohjola, 2004).

Most existing definitions of waste commonly include the terms or ideas of discard and disposal, where disposal implies that there is a correct place to discard waste (Pongrácz & Pohjola, 2004). Others argue that waste can be defined along the categories of Purpose, Structure, State, and Performance (Pongrácz & Pohjola, 2004). A definition that I feel best captures waste as a whole is, "waste [is] what we do not want or what we fail to use" (Gourlay, 1992). This definition is useful because it adapts depending on the perspective or time of use (de Kadt, 1999). The "we" in this definition implies both producers and consumers, as there can be waste at all levels of production and consumption. When does something become waste or stop being waste? Waste is a dynamic concept and this definition by Gourlay acknowledges that.

Sarah Moore suggests using Zizek's idea of "parallax view" to describe the object of waste as a parallax object (Moore, 2012; Zizek, 2006). A parallax object is one that changes qualities when the perspective changes, in other words an object that has duality (Zizek, 2006). This duality exists in waste, as the perspective changes it could be considered trash or treasure, waste or commodity (Moore, 2012). This arguably makes waste as an object difficult to govern, because some parties want waste to proliferate while others want it eradicated.

Waste management was created to manage and minimize the growing waste issue. In the theory of waste management, it can be defined as the "control of waste related activities, with the ultimate aim of resources conservation and protection of human health and the environment"

(Pongrácz et al., 2004). But waste minimization is directly at odds with waste management's business model. It must be noted here that the theory of waste management is different than the practice or business of waste management, which is more technical. But theory guides practice. Waste is a commodity, which is money for the business of waste management, so why would they want to reduce the amount of waste people create? "One man's trash is another man's treasure," becomes literal in the period of waste management as a commodity (de Kadt, 1999). Defining waste becomes more complex when considering it as a commodity with the recycling industry (Pongrácz & Pohjola, 2004).

Alternatively, materials management prioritizes environmental protection and resource conversation (de Kadt, 1999). If waste management industries used a materials management approach as a guiding framework rather than waste management, I argue that this would avoid ongoing waste production. This would shift the focus away from consumers to producers, avoiding individualization, the type of environmentalism that currently dominates our culture (Maniates, 2001). Individualization of responsibility is when environmental problem are framed as an individual's problem and subsequently they alone hold the solution (Maniates, 2001). Individualization in other words tells individuals, "your uninformed consumption choices caused this environmental degradation so your wiser consumption choices will solve it" (Maniates, 2001). Framing environmental issues as an individual's responsibility weakens our ability to come together to make collective change (Maniates, 2001). Those who hold power, such as producers are framing environmental issues in this way to maintain the current system of resource extraction and production, which will be discussed further in the next section.

Environmental policies have historically been command-and-control, which are state centered and use a top down approach that relies on regulations rather than financial incentives (Fletcher, 2017). There are proposed alternatives to command-and-control like traditional ecological knowledge, ethics of care, or even neoliberal ways of thinking (Fletcher, 2017). There are many approaches to environmental policy that navigating the landscape can be challenging. A theoretical analysis I found useful to navigate this complex landscape is Michel Foucault's "multiple governmentalities" (Fletcher, 2017; Foucault & Gordon, 1972). This is the idea that a governing body that manages people and objects can change their relationship through positive means so that the people can self-govern and self-regulate (Foucault & Gordon, 1972). These means of changing the relationship or dynamic between governing and governed can be through

discourse, knowledge production, and balancing the power dynamic (Foucault & Gordon, 1972). It expands governing to the governed and allows individuals to participate in their own governance if they are willing (Foucault & Gordon, 1972). This can be a positive or negative thing, depending on the intentions of those who are holding power and governing.

I argue that environmentality builds on Foucault's governmentality, which originally combines the terms government and rationality. Environmentality describes the power relations in environmental governing of human-environment interactions (Barnhart, 2016). It studies the way that a governing body can change the way people think about or internalize a new way of thinking and action towards the environment, which creates environmental subjects, and how this furthers the governing body's agenda (Barnhart, 2016). In terms of waste and waste management, environmentality can help to explain the way that recycling has changed over time to become something individuals in some regions have internalized and almost intuitively do.

Banning single use plastics has broad appeal and public support because they are ever present and visible as litter (Andersen, 2021; Great Canadian Shoreline Cleanup, 2019). The passing of the ban took advantage of what John Kingdon calls a policy window (Kingdon, 1984). A policy window is when problems, policy, and the political environment align to open a window of opportunity to pass legislation (Kingdon, 1984). Using this policy window expands environmentality by the governing state to further their agenda of appearing to be more environmentally friendly. The participants are willing, as they approve of and even urged the government to pass the ban. I should clarify here that humans and the environment are intertwined, as described by the idea of socio-natures, but the legislation is written as though humans and environment are separate so when speaking about the ban, I will defer to utilizing their language.

The single use plastic ban places the burden and responsibility to change on individuals. "With great power comes great responsibility" (Lee, 1962). But what happens when there is great responsibility and little power? This explains the current state of things with individualized responsibility of waste and recycling. When producers switched from refillable to single use packaging, they saw an opportunity to take the power to frame waste as an individual's responsibility (Jaeger, 2018). The beverage industry ran ad campaigns through Keep America Beautiful in the 1970s to frame litter as an individual's responsibility and even coined the term litterbug (Strand, 2008). This history is relevant to our Canadian context because Keep America

Beautiful has an international affiliate with Canada and the term litterbug is pervasive in Canadian culture (Keep America Beautiful, 2016).

Recycling is ideologically popular and is a daily practice completed by individuals, but it is misdirected towards consumption rather than production (Jaeger, 2018). Individuals are given the responsibility to manage waste at the end of the production line, but we do not have the power to make any relevant environmental changes before the point of consumption. Andrew Boardman Jaegar uses Antonio Gramsci's theory of hegemony to explain that this highly individualized action weakens our ability to come together to make collective change; removing individual power undermines the potential for collective power (Jaeger, 2018). Some of this power comes in the form of who and how waste is defined.

The single use plastic ban maintains this individualization by giving individuals them responsibility but no power. Thus, it weakens people's capacity for collective environmental change because people become complacent with the busyness that the ban gives us and stay content with the incremental change. However, governmentality proposes that power flows everywhere and that there is still potential for grassroots movements to change the way waste issues and solutions are framed (Barnhart, 2016). Those who frame waste as an issue hold the power to define it and its management. The single use plastic ban is framed as a solution, but it is a micro-solution for a macro-problem (Jaeger, 2018). Framing single use plastics as an individual's issue diverts culpability from those in power (Maniates, 2001). We need to utilize the theory of materials management to frame waste as a production issue and promote producer-oriented legislation rather than the dominant consumer-oriented legislation.

The precautionary principle can be colloquially defined as "better safe than sorry." It is a guiding principle in waste management that suggests a substance or an action should not be taken when the threat to environment is unknown (Cameron & Abouchar, 1991). Although there is no agreed upon definition, this principle still guides policy as a means of protecting the environment above any economic gain (Cameron & Abouchar, 1991). This principle has great appeal because it makes people feel like their health and the safety of the environment is being considered before profits (Cross, 1996).

Upon first glance, the precautionary principle seems to be an effective way to guide policy: if there is uncertainty, do not proceed. But since there is no agreed upon definition, who is to say what level of harm is acceptable to the environment? This key criticism states that the

precautionary principle does not designate when the level of uncertain risk rises to the point that would warrant regulation (Cross, 1996). It is argued that the elimination of one risk could lead to the creation of another ancillary risk that has the potential to be more harmful (Cross, 1996). Another criticism is that the mere allegation of harm could stop an activity or substance from continuing, no proof is needed (D'Souza & Taghian, 2010). The precautionary principle by nature favors the identification of risks rather than benefits (D'Souza & Taghian, 2010). Thus a more holistic framework is needed, with a balance of environmental risks, benefits and regulatory uncertainty (D'Souza & Taghian, 2010). An active form of the precautionary principle balances these things and chooses the least risky option that is available while taking responsibility for any risks that might occur (D'Souza & Taghian, 2010).

With the single use plastic ban, the elimination of these plastic items will give rise to alternatives. Are these alternatives better than the items that were banned? Did the federal government complete as life cycle assessment (LCA) and compare the use of the plastic items to the potential alternatives? An LCA is used to determine the environmental impact of a product for its whole life, from production to disposal. Completing an LCA is a way of observing the precautionary principle, because if you knew the harms or benefits of each alternative then you could decide whether to proceed. If reducing waste sent to the landfill is the goal, then a ban is sensible. But if reducing overall harm to the environment is the goal, as is the goal of materials management, then an LCA would need to be performed.

Precautionary consumption is the practice of consumers, typically by women, to mitigate risks of exposure to toxins by making educated consumption choices (Scott, 2017). This practice places pressure on individuals to manage their exposure to toxins rather than pressuring for stricter regulatory enforcement (Scott, 2017). The precautionary consumption can be viewed here as practicing the precautionary principle at an individual level. This practice is not fair to those who do not have the time or resources to research what is considered safe or not safe and would leave them exposed to any such risks. Not only is this practice not fair, but it is not shown to be effective in protecting individuals from harm to exposure like a strong regulatory system would (Scott, 2017). The idea that you can avoid exposure to chemicals by not purchasing particular products is a consumption fallacy (Scott, 2017). Consuming your way out of exposure simply reinforces the capitalist market and does not address the regulatory issues that allow these exposures in the first place.

This practice of precautionary consumption has been applied to the consumption of plastics, as plastics have toxic properties and have been listed as a toxic substance under the Canadian Environmental Protection Act (Government of Canada, 2020). The burden is on the individual to limit their plastics and its toxins rather than develop a strong regulatory system to limit their production. This is especially true in the Zero Waste lifestyle, which is the idea that one can limit their waste to zero by making wiser consumption choices. There are Zero Waste celebrities within the community, often women who famously pose with their "trash jar," a mason jar full of their waste that could not be diverted by recycling or composting (Johnson, 2013; Singer, 2021). This trash jar is the epitome and ideal goal for those who practice the Zero Waste lifestyle.

To practice the lifestyle though, one must buy sustainable alternatives. This again, is trying to consume your way out of a problem rather than addressing the issues of plastic production. One of the celebrities of the Zero Waste community, Lauren Singer even went on to open her own store that sells sustainable products, which got her a spot on the Forbes 30 under 30 list (Forbes, 2020). To receive a spot on the Forbes list means you are one of the top entrepreneurs. You do not get on the list without advancing the capitalist market. This is a top critique of the Zero Waste movement; it is marketed to you in a way that encourages you to purchase all new items like matching jars and canvas bags. It highlights consumption of new things instead of inspiring you to use what you already own. These swaps are sometimes not that much more sustainable than what is already on the market. For example, you would have to reuse a canvas bag at least 131 times to equal the same amount of emissions from using a single use plastic bag (Society, 2020).

At its core, the Zero Waste movement also idealizes busyness, a term that means completing a work that fulfills ones sense of achievement without actually reaching the central or larger goal (MacBride, 2013). Busyness does have a positive effect and can make one feel good about the actions they are taking, but it does not address the larger issues at hand (MacBride, 2013). Limiting one's waste by living the Zero Waste lifestyle does have a positive effect, which is why it can be so appealing. But this version of precautionary consumption and avoiding plastics does not address the fact that plastics are ever present in society and does little to challenge the capitalist framework that perpetuates waste. Zero Waste and its avoidance of

plastics is similar to the single use plastic ban in that it focuses on an individual's responsibility to make small changes while larger production issues are able to persist.

The Zero Waste movement at its core seeks to conserve resources through responsible consumption, which does little to address production. The treadmill of production is a theory that was introduced in the 1980s by Allan Schnaiberg as a response to the post-World War 2 environmental degradation that was occurring (Gould et al., 2004). The main idea of the theory is that the capital that is accumulating in Western economies is used to replace laborers with technologies and those technologies require more energy (Gould et al., 2004). Each round of expansion on the treadmill requires more natural resources to keep up with the demands of society and social progress (Gould et al., 2004). The use of the word treadmill is to signify a society running in place while remaining in the same position; it appears to be moving forward but in reality it is not (Gould et al., 2004).

This theory focuses on production rather than consumption because most decisions that impact the environment are made at the level of production (Gould et al., 2004). Consumers do not get a choice as to what type of technologies, labor, or volumes of each are used to create a product or how much harm is done in the process of production (Gould et al., 2004). Consumers are at the end of the treadmill or production line and have very little to no say in production (Gould et al., 2004). Individuals can only consume the outputs that are given to them on the market, thus the theory focuses on the production side of things (Gould et al., 2004).

This is an important point that cannot be ignored in waste management and education. The emphasis tends to be on the individuals' actions and ignores the producers' responsibilities. This is not to say that individual action doesn't matter, but individuals as consumers are limited in their influence. To focus on the individuals' role is a diversion from the true culprit, the producers. Those in power or the hegemony can take action on waste, which is done so through formal waste management (Jayasinghe et al., 2019). The power is in how waste, and its management is defined.

I argue that waste as an object becomes waste as an issue when it becomes visible. Single use plastics as waste gained visibility when they became prominent in litter (Great Canadian Shoreline Cleanup, 2019). Waste as an issue then requires political action and management (Hird et al., 2014). The single use plastic ban is the political action that the government is taking as a form of formal waste management. However, this action continues to place responsibility on

individuals. This does not challenge the association between economic growth and waste, or the treadmill of production because alternatives to single use plastics are still being produced. The ban internalizes governmentality by creating subjects of individuals by framing a new way of thinking about single use plastics as an individual's issue (Agrawal, 2005).

Those who have power to frame and define waste also define the ways it is managed. By framing single use plastics as an individual's responsibility, it diverts culpability from producers and diminishes our ability to come together to make greater environmental change. The single use plastic ban is a form of precautionary consumption legislated by the federal government.; individuals will have to avoid single use plastics because of their potential harm to human and environmental health. The ban uses environmentality to govern subjects to behave more environmentally, giving individuals the responsibility but no power. When given no power, individuals can only make nominal changes, which is not enough to combat the larger issue of climate change. The ban does little to challenge the treadmill of production because single use alternatives will continue to be produced and consumed within the capitalist system. Individual consumption choices are environmentally important, but our control is limited by producers and political forces that frame it solely as individual's responsibility. Collective action can reframe and reshape the ways in which we define waste and its management through producer-oriented legislation.

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Reflections on Research

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Introduction

These are my personal reflections on my research and learning process. My research process includes courses as well as my portfolio research in which I conducted a survey and completed further thorough research on waste. Through this, I have expanded the ways I think about waste, policy, and environmental education. I continue to challenge the ways in which I approach waste management and waste reduction in my personal life as well as the ways I critically engage with these topics at a societal scale.

Prime Minister Justin Trudeau announced on June 10, 2019 that Canada would ban six harmful single use plastics (Trudeau, 2019). As somebody that follows a low waste lifestyle, I was immediately excited for this announcement, and as an American, I was impressed by this progressive commitment to the environment. My research was predominantly inspired by this announcement. I decided to examine York students' behaviours around single use plastics to inform ways to make the transition away from single use plastics easier on campus. In order to do this, I had to collect data about the current waste management operations on campus, including waste audit data. The waste audit provides details about what is found in York's waste and is provided annually in one report (McAlpine, 2020). The other details like daily operations, infrastructure, and finances of waste on campus are spread among different divisions and people, which took some investigative work on my end. When I found out that York hasn't studied waste in over ten years, I was surprised considering that their University Academic Plan highlights sustainability (Esseltine et al., 2010; York University, 2020). The outdated waste study was completed by a group of students and not by the school itself. When the school proclaims to be trying to advance the United Nations sustainability development goals (York University, 2020), why is it left to highly motivated students to study York's waste management?

The impact study in the first section of my portfolio is based on existing waste data on York's campus that I compiled. I also conducted research on who has access to York's waste data and who was willing to share it with me. An example of such data is York's annual waste audit. Under O. Reg. 102/94, Section 51 states that all educational institutions must complete an annual waste audit in which the amount of waste generated on campus is recorded (O. Reg. 102/94, 2014). Although the mandated waste audit for York exists, the challenge was finding the right person who had access to it and was willing to share it with me.

The most challenging thing about this information search was only being able to communicate online via email with people I have never met before. I feel that having met with people in person would have developed more trusting relationships. I contended with many different and somewhat challenging styles of communication from different York departments and employees. I learned my lessons in patience and being descriptive in my requests through this whole process, and I remained determined in my search for information, which proved worthwhile. I was able to gather most of the data I was interested in and more.

At the time of my data collection, York's website was undergoing a rebranding. Some sections of the website had already been updated while others were still in transition. This gave me the impression that I was missing out on valuable information. I combated this potential impediment by contacting the relevant division managers of the university with my research questions. I created relationships with a few key people who assisted and encouraged me in my pursuit of knowledge, including Nicole Arsenault and Tom Watt. We all shared the desire to make York a more sustainable campus, and this motivated me to complete influential and actionable research.

The previously mentioned waste audit process that all educational institutions are mandated to complete annually does not require the auditors to measure the amount of single use plastics in the trash, it only requires the measure of the broader category of plastics. The only detail the waste audit includes is the weight of plastic by recycling code. Recycling codes are numbers found within recycling symbols at the bottom of product packaging to identify the type of plastic used in manufacturing. This would be helpful if all single use plastics fell under one recycling code, but they do not. The six single use plastics that will be banned fall into four different recycling codes, thus making it impossible to deduce how much single use plastics are used on campus based on the current waste audit data (American Chemistry Council, 2021). With the available data there is no way to separate out the other non-single use plastics that would share the same codes.

Not only was I not able to find out exactly how much single use plastic waste is thrown away on campus, but I also had difficulty getting solid answers about how the school's food vendors will transition away from the banned single use plastics. This is due to the structuring of the school's food vendors, where one division is managed by the school and the other division is made up of many individual private vendors. This latter division represents 60% of food sales on

campus and is represented by individual restaurants like the ones found in York Lanes, a popular dining area for students (T. Watt, personal communication, January 27, 2021). Each of these vendors has their own corporate management with different values and rules that will respond to and realize the ban in different ways. Although I couldn't get specific single use plastic data from the private division, I was able to find that the division managed by the school spends almost $75,000 annually on single use plastics (T. Watt, personal communication, January 27, 2021). This number can be extrapolated to estimate that the private division spends approximately $112,000 annually on single use plastics; further research is required to calculate the exact cost of single use plastics.

To summarize, there are no data on the amount of single use plastics from York going to the landfill, I do not know the exact amount York spends on single use plastics, or how food services will transition to the single use plastics ban. Without these answers, I was feeling discouraged and at this stage of my master's research. I was feeling like a failure, like all hope was lost, and that they'd never award me a degree, among other feelings. But my work continued, and all it took was some reframing and remembering my research goal. I focused on understanding student behaviours around waste and used that to inform education material. I realized that the obstacles I encounter as I research become part of my findings. Therefore, I continued designing a survey about waste. I created the survey specifically for current York students because, more than the faculty and staff, students interact with and utilize the campus in a variety of ways and could gain more from resulting environmental education initiatives. As I gathered data and developed the survey, I realized how important organic waste is to the context of York and determined that I should pivot and add it to my research and survey.

Pivoting

The waste audit illuminated that half of York's waste sent to the landfill is organic waste (McAlpine, 2020). Although I was interested in single use plastics because of the upcoming federal ban, I am interested in and concerned with waste reduction in general. Therefore, I decided to incorporate organic waste in my research and included survey questions about organic waste and composting. One of the differences between organics and single use plastics is that organic waste does not always require highly technical machinery to be diverted and processed like plastics do. Composting can even be done in a backyard, but large amounts like York's are

collected and processed at an external facility. Most single use plastics are not recyclable in the City of Toronto; thus they cannot be diverted and are destined for the landfill (City of Toronto, 2017). If we are purely looking at increasing diversion, it is more feasible to divert organic waste from the landfill. So focusing on organic waste would be a simple way for York to increase their diversion, as they already have the infrastructure on campus to collect it. It was an easy decision to include organic waste in my research, not to mention my lack of single use plastic data. Adding organics waste and composting questions to the survey was a simple change because I used the same format and based it on the Theory of Planned Behaviour just as I had with single use plastics.

Survey

Developing survey questions was easier than I anticipated because I was able to use a pre-existing guide on how to create surveys based on the Theory of Planned Behaviour (Ajzen, 2019). The questions were sorted by the three factors that can predict behaviour: normative, subjective, and perceived control (Ajzen, 1991). The challenge was to word and design the questions as to reduce error in the survey (Fowler, 2020). The goal was to ensure the reliability of the questions so that they returned valuable responses (Fowler, 2020). I shared the survey draft with different people to get feedback. Some of the readers were researchers with experience in developing surveys, and some were peers who gave me feedback on clarity of questions. This trial run was key for me to receive useful feedback towards revising the survey before its official release.

The university closed all on-campus classes on March 16, 2020 due to the COVID-19 pandemic (Lenton, 2020). The school remained closed throughout the remainder of my research, which was challenging in more ways than one. I had to take this into consideration when forming my survey questions because there is an entire class of students that attend York but have never stepped foot on campus. Would I still want their input on my survey about waste on campus? After some deliberation, I decided that the survey should remain open to all York students, whether they have been on campus or not. I decided to include them because it is their waste related behaviours that I am interested in, not just how they view waste on campus.

Something that I recognized early in the formation of this survey was that it was essential to avoid priming students to answer in a certain way. Priming respondents can lead to biased

answers and diminishes the integrity of the survey. I wanted to include what I had learned in my impact study about York's waste, but I did not want to prime students by providing them with this data. I still wanted reciprocity though: I show them what I know, they show me what they know, and then I bring that all together to create educational material that is unique and highly tailored for and by the students. The solution was to create an infographic that was made available to the respondents upon completion of the survey (Appendix 8). Respondents could download the infographic for future reference, and it will be given to the Office of Sustainability as part of our partnership agreement.

Partnership

I partnered with York's Office of Sustainability to receive assistance with the promotion and distribution of the survey. In return, I would provide them with the survey analysis and give them access to any of the environmental education material that I created. This was an easy and natural partnership to make because it benefitted both parties. I got mentorship and guidance on how to properly distribute a survey to maximize responses, and they got insights into the way students view waste on campus as well as education material. Through this partnership, I was also able to connect with the right contacts to gather more detailed information on York's waste data. It was through this partnership that I was given the opportunity to be the inaugural zoom interviewee for a new sustainability series to be shared on York's website.

This partnership also gave me the opportunity to present the survey results to the relevant upper management supervisors at York. This is arguably the most important thing to come out of this partnership, because this has potential to be the most influential aspect of my research. I feel that it is one thing for me to collect data and analyze survey responses from students, however delivering my findings of the survey results and analysis to the school's upper management puts the metaphorical ball in their court. With this information, management has the power to enact positive change towards sustainability that is based on data and students' views and needs.

Distribution and Analysis

Due to the COVID-19 pandemic and its restrictions, I was not able to go from classroom to lecture hall to promote my survey. I was not able to sit in Vari Hall and ask for responses, but I decided to distribute the survey by email. *This Week @ York* is a weekly email that is sent to all

currently active York students and is arguably the email that would have the most reach. But as a student researcher, I could not simply ask *This Week @ York* to advertise my survey because they do not promote student led surveys, as they would be flooded with requests from hundreds of students. Hence my partnership with the Office of Sustainability was also helpful here, as they approved and sponsored my survey, which gave it the primary spot on the *This Week @ York* email. Through this survey distribution I received 94 responses to the survey.

I used Google Forms as the platform to design and distribute the survey as it accumulates the results into one downloadable spreadsheet file. I worked off this file to complete some descriptive statistics and qualitative analysis. The survey results were a combination of nominal and ordinal data, as it used a combination of ranked Likert scale and multiple select with fill-in-the-blank. I thematically coded the fill-in-the-blank responses by pulling out the repeating key themes. I used Excel to graph the results of each question and to calculate some simple descriptive statistics. I am not an Excel or statistics expert, however learning how to use Excel as a research tool for data visualization and analysis was a gratifying and humbling experience.

Changing the way I think about waste

Coming from an environmental science background, I never had much experience with critical theory or theoretical frameworks. It was a complete mind shift moving away from the technical science of lab work to learning about new ways of thinking. It was a move away from black and white or right and wrong to everything as grey and nuanced.

I originally came into this degree thinking that eliminating plastic from your life is one of the best things you can do, environmentally speaking. I was always defensive when I heard criticisms about the Zero Waste lifestyle because I could see for myself the positive physical impact it was having on my trash can. I went from taking out the trash every other day to taking it out every other week, and with much smaller bags at that. I was shopping at bulk grocery stores and I was avoiding purchasing any sort of plastic. But admittedly, this was an extreme burden, and I would feel overwhelming guilt anytime I had to use or buy plastic. Although I feel my efforts were valuable, I came to realize I was viewing plastic and waste as an individual's responsibility rather than examining the systemic issues that make us depend on plastics. In reading about the theory of waste and waste management, I learned about the many ways that the individual can be led to believe that they are responsible for environmental devastation rather

than manufacturers and producers. A way to challenge this is by thinking critically about waste management through ideology critique, where ideologies direct attention to individual behaviours as opposed to the true systemic issues (Gunderson, 2017). Using ideology critique, I should be asking, "Why do I, as a pro-environmental person believe that eliminating plastics in my personal life will curb total landfill use and greenhouse gas emissions, and continue to do so even though I do not fully believe this?" (Gunderson, 2017).

Through my research, I found that my personal reason for avoiding critique is the idea of busy-ness (MacBride, 2013). Busy-ness is described as the fulfilling sense of achievement you get from doing work that has positive side effects but fails to reach the larger central goal (MacBride, 2013). I was happy to only look at the small positive benefit I was seeing in my own trash can and ignoring everything else, especially my bi-monthly flights back home to the states (pre-COVID). I was embodying the motto, "out of sight, out of mind," and only examining the physical waste in my life. As long as my trash can was empty, my heart was full.

A perfect example of when I was able to call out and name this diversion from bigger issues was when I was leading a waste audit activity in my Popular Education class. The goal was to have participants audit their waste for three days to bring awareness to what they are throwing out and using this knowledge to hopefully lead to future waste reduction. I also participated in this waste audit myself and I happened to need to replace my iPad during the audit. When I was at the Apple Store, I begrudgingly accepted the new iPad with all the plastic wrapping and noted that I would have to add this additional plastic waste to my audit. But upon further reflection, I realized that I just got rid of an entire electronic device. I was so concerned about the minimal amount of plastic waste that would be in my trash can rather than considering the growing pile of e-waste I just contributed to. Busy-ness and the Zero Waste lifestyle place such a narrow focus on an individual's plastic waste that you tend to overlook or forget about other issues like e-waste, fast fashion waste, carbon emissions from travelling, and the list goes on.

It was through this master's program and reading deeper about waste issues that I learned that focusing on an individual's plastic waste and diversion does not place the responsibility on the culpable party. Individual producer responsibility (IPR) is an attempt to shift the responsibility back onto the responsible party and is being incorporated into Ontario's waste policy (Ontario, 2017). IPR makes producers environmentally and financially accountable for

processing waste throughout a product's lifetime (Ontario, 2017). But will this shift of focus away from individuals to producers result in increased diversion?

Recycling is a waste policy that sought to increase diversion of waste away from landfills. But the history of recycling in Ontario reveals a hidden agenda. The drinks industry indirectly created the blue bin in Ontario when they transitioned away from the more sustainable reusable bottles to single use bottles (Canadian Institute for Environmental Law and Policy, 2008). At the time, environmental groups opposed blue bins because it was a switch away from refillable bottles (Canadian Institute for Environmental Law and Policy, 2008). The drinks industry increased waste by moving away from refillable bottles and then indirectly created the blue bin to increase the waste diversion that they themselves created, all while using more resources to create single use containers. They created a problem and used a band aid solution that we now must rely on for diversion.

The blue bin is a form of greenwashing, because it appears to be more sustainable than it is, especially when you consider the context its origin story provides. It deceives the public and focuses on an individual's responsibility towards waste diversion, and this focus on diversion does not address the larger issue of over production and consumption. With the rise of consumption, an alternative that is gaining popularity is green consumerism, or more environmentally friendly and sustainable purchasing options, but people cannot consume their way out of climate change (Gunderson, 2017). Green consumerism is just another form of greenwashing because it places an incongruous relationship between the environment and capital.

Through my studies, I have gained the knowledge to critically analyze the single use plastic ban as a form of greenwashing. Although I originally applauded the government and their efforts towards sustainability, now I question its intentions and wonder if it is a diversion from other larger environmental issues. One week after the announcement of the single use plastic ban, Trudeau approved expansion of the Trans mountain pipeline (Meyer & De Souza, 2019). Considering the temporal context of the announcement, it is greenwashing and a diversion from the immense environmental damage that would result from the expansion of the pipeline.

I've also shifted away from placing so much responsibility on myself to be Zero Waste and plastic free, but instead favoring progress over perfection. I should be clear here that I would never discourage anybody from reducing their waste, recycling, or avoiding single use plastics.,

but now I am equipped with the knowledge to think critically and see that placing the responsibility of waste diversion solely on the individual is a diversion from systemic issues. Individual action cannot be as effective as systemic changes, as seen by the COVID-19 pandemic. When the entire world stopped and individuals remained at home and stopped driving and flying, global emissions of carbon dioxide in 2020 only went down by 6.4% (Tollefson, 2021). Although individuals made deep sacrifices and stayed home, it still was not enough to curb emissions to combat the global warming of 1.5 degrees above pre-industrial levels (Tollefson, 2021). There are larger systems in place that have greater polluting and waste impacts than the activity of individuals.

The single use plastic ban is a policy that attempts to address a systemic issue, however it still places the burden and responsibility of behaviour change on the individual. This interesting duality was another reason that I chose to research this topic; can systemic change in the form of individual behaviour change be effective? Another duality I found interesting when researching is the dual meanings of the words that I am commonly engaging with. Waste, as discussed in my theory paper, can change meanings based on the context or based on the beholder. Waste can be trash or treasure, disgusting or desirable, crap or commodity, garbage or goods. When examining waste, it is important to consider the context so that it can reveal what definition of waste is being used. Diversion also has dual meanings. Diverting in a technical sense away from the landfill or diverting away from a topic or issue. I find this one interesting because producers are diverting from the issue of their waste by not diverting their physical waste; they are successfully diverting from an issue by failing to divert objects.

Environmental Education

Between my undergraduate and my master's degree I worked as a Park Ranger, and I always knew that I enjoyed teaching people outside of the traditional classroom setting. But I never had a word for what I was doing until I started this program. Environmental education is where I am the most comfortable and happiest. Even as I worked my way through my environmental education diploma, the way I thought about teaching and nature has changed. I always thought of nature as separate from society, as a destination that we are meant to reconnect with to combat society's growing nature deficit disorder (Louv, 2008). But nature and society are intertwined, and when we seek to "reconnect with nature," it is contradictory (Fletcher, 2017). If

we treat nature and society as separate realms that need to be reconnected, then specifically seeking to connect with nature only reinforces the idea that they are separate (Fletcher, 2017).

This concept connects to waste in interesting ways. In the natural world, there is no waste and everything is used, reused, and recycled. However, this statement implies that the natural and human world, or society are separate. It is undeniable that with humans and society, there is waste, and most societies in North America have not yet figured out a way to be as efficient with resources as the natural world. In this way, humans become separate and different than the natural world. The ability to create so much waste is one way that separates humans from the natural world. Here I mean separate as differentiated and not physically separate; we are still interconnected. There is opportunity for future research with this concept of socio-natures and waste and because humans and nature are interconnected is the very reason that tackling and educating society about waste issues is so important.

I drew much of my research inspiration from concepts in my Popular Education course, specifically Freire's teachings on critical pedagogy (Freire, 1970). Critical pedagogy moves away from what Freire called the "banking model of education" towards a more reciprocal and student-centred learning (Freire, 1970). The banking model of education is the most common form of education used and is typical of classroom setting teaching. In the scenario, a teacher holds all of the knowledge and imparts this knowledge down to the students who are simply empty vessels waiting to be filled by the all-knowing teacher (Freire, 1970). This banking model is oppressive, not inspiring, and doesn't lead to curious or lifelong learners. Freire's critical pedagogy places the students and teacher at equal levels of power and emphasizes inquiry-based learning (Freire, 1970). This fosters a flow of knowledge between students and teachers with dialogical learning (Freire, 1970).

It is this flow of knowledge and the dialogical aspects of learning that I am most interested in. This was influential in the formatting of my research. I wanted to ensure that I was not using the banking model of education, as it is a passive learning style that doesn't inspire change (Freire, 1970). Thus, I structured my research to be student-centred; it was the students' responses that I was most interested in. Dialogue and a flow of information between me as the researcher/teacher and students was challenging with COVID restrictions. But there was a flow of information between us by using surveys and infographics online. My role as a student

researcher constantly shifted between learner and teacher. Critical pedagogy allows for this type of role shifting and exemplifies it.

I understand and have moved through this research keeping in mind that education does not automatically lead to pro-environmental behaviour (Kollmuss & Agyeman, 2002), however, education is a key part of frameworks that seek to encourage pro-environmental behaviour (Steg & Vlek, 2009). Although educators and researchers can work hard to educate students on campus about waste reduction and diversion, it does mean it will automatically and immediately lead to better waste diversion numbers. I find this challenging to grapple with when I put so much time and effort into making educational materials as I know that we cannot rely on education alone to change behaviour; you must also consider the infrastructural factors of waste on campus.

This is why presenting my research to upper management at York is important, as they have the power to change any infrastructural barriers for reducing waste on campus. The presentation was not originally part of my research plan and at first felt like excessive work assigned by the Office of Sustainability. Initially, I obliged because I wanted to be an agreeable and a useful partner to the Office of Sustainability, but I quickly realized that the presentation is another form of environmental education and not just another task, and it has the potential to create real change on campus.

I also had the opportunity to present some of my research to a group of keen students. These students plan to start an initiative on campus to reduce takeout waste by incentivizing reusables. They hope to sell stickers that will be used almost like a punch card and users will be rewarded with discounts or free items at participating restaurants on campus. They were interested in student behaviours around waste, and I was happy to share my survey analysis with them. This was a dialogical opportunity to facilitate the flow of information between students and student researcher.

The Culmination

In learning about environmental policy, waste management, and environmental education, I am now able to think critically about waste management policies. I have also been able to think critically about choices in my personal life and have come to realize that waste management does not have to be all or nothing. Through my learning, I can critically engage with theories about waste as an object to waste as an issue that requires action. Waste

management and diversion is not solely the responsibility of an individual, but it has been internalized within people. I can now step back and analyze the single use plastics ban as a form of governmentality, as it continues to place the responsibility on the individual. Previously, I never engaged in theory, or these concepts of waste and I only viewed waste at a surface level. But through my learning process, I have a deeper understanding of waste, policy, and environmental education. My research at York not only works towards advancing UN sustainable development goals, but it also has the potential to advance York to be a more sustainable community. I hope that this research can influence the way York looks at waste and can equip students with the knowledge to make positive changes.

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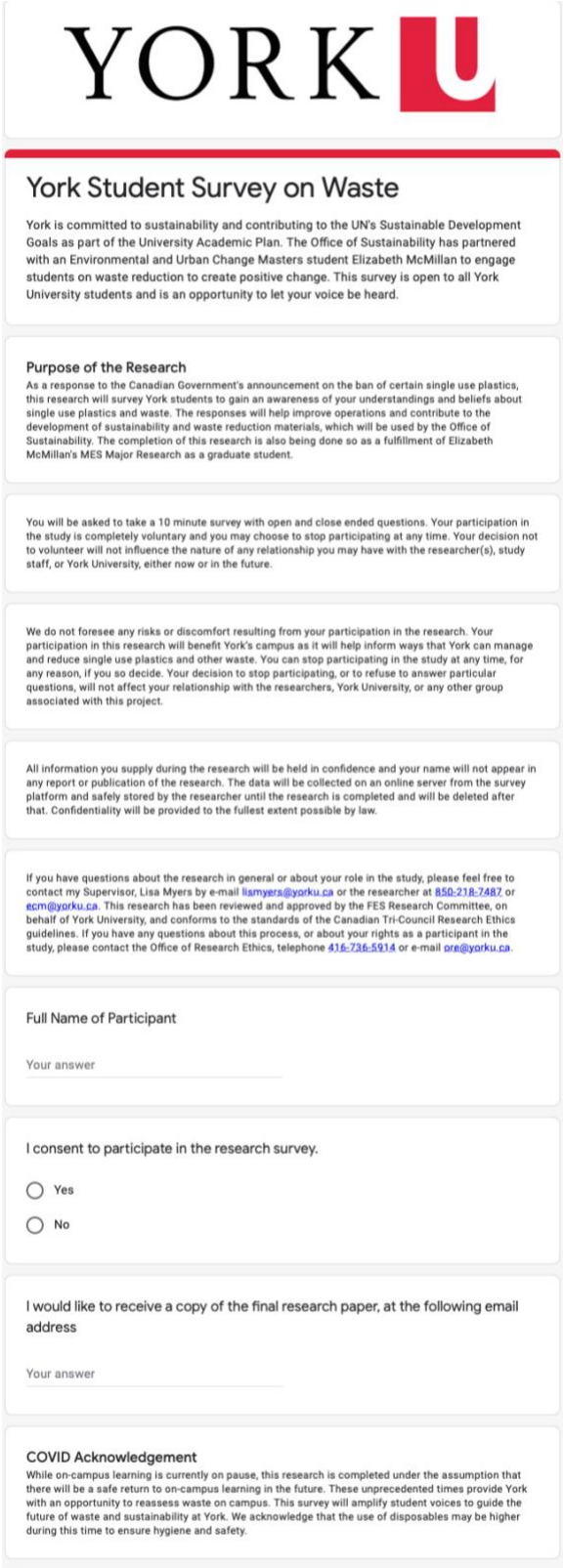
Appendices

Appendix 1- Student Waste Survey- Consent form



YORK U

York Student Survey on Waste

York is committed to sustainability and contributing to the UN's Sustainable Development Goals as part of the University Academic Plan. The Office of Sustainability has partnered with an Environmental and Urban Change Masters student Elizabeth McMillan to engage students on waste reduction to create positive change. This survey is open to all York University students and is an opportunity to let your voice be heard.

Purpose of the Research

As a response to the Canadian Government's announcement on the ban of certain single use plastics, this research will survey York students to gain an awareness of your understandings and beliefs about single use plastics and waste. The responses will help improve operations and contribute to the development of sustainability and waste reduction materials, which will be used by the Office of Sustainability. The completion of this research is also being done so as a fulfillment of Elizabeth McMillan's MES Major Research as a graduate student.

You will be asked to take a 10 minute survey with open and close ended questions. Your participation in the study is completely voluntary and you may choose to stop participating at any time. Your decision not to volunteer will not influence the nature of any relationship you may have with the researcher(s), study staff, or York University, either now or in the future.

We do not foresee any risks or discomfort resulting from your participation in the research. Your participation in this research will benefit York's campus as it will help inform ways that York can manage and reduce single use plastics and other waste. You can stop participating in the study at any time, for any reason, if you so decide. Your decision to stop participating, or to refuse to answer particular questions, will not affect your relationship with the researchers, York University, or any other group associated with this project.

All information you supply during the research will be held in confidence and your name will not appear in any report or publication of the research. The data will be collected on an online server from the survey platform and safely stored by the researcher until the research is completed and will be deleted after that. Confidentiality will be provided to the fullest extent possible by law.

If you have questions about the research in general or about your role in the study, please feel free to contact my Supervisor, Lisa Myers by e-mail lismyers@yorku.ca or the researcher at 850-218-7487 or ecm@yorku.ca. This research has been reviewed and approved by the FES Research Committee, on behalf of York University, and conforms to the standards of the Canadian Tri-Council Research Ethics guidelines. If you have any questions about this process, or about your rights as a participant in the study, please contact the Office of Research Ethics, telephone 416-736-5914 or e-mail ore@yorku.ca.

Full Name of Participant

Your answer

I consent to participate in the research survey.

- ◯ Yes
- ◯ No

I would like to receive a copy of the final research paper, at the following email address

Your answer

COVID Acknowledgement

While on-campus learning is currently on pause, this research is completed under the assumption that there will be a safe return to on-campus learning in the future. These unprecedented times provide York with an opportunity to reassess waste on campus. This survey will amplify student voices to guide the future of waste and sustainability at York. We acknowledge that the use of disposables may be higher during this time to ensure hygiene and safety.

Appendix 2- Survey Questions: Single Use Plastics

1. I believe reducing my single use plastics is

(1) Not important to (7) Important

2. Most people around me would approve of me reducing my single use plastics

(1) Disagree to (7) Agree

3. Most students at York University limit their use of single use plastics

(1) Disagree to (7) Agree

4. I am confident that I can reduce my single use plastics while on campus

(1) Disagree to (7) Agree

5. Reducing single use plastic consumption involves more than my individual choice

(1) Disagree to (7) Agree

6. I intend to reduce my single use plastics while on campus

(1) Unlikely to (7) Likely

7. In the past, I have tried to reduce my consumption of single use plastics while on campus

(1) Disagree to (7) Likely

8. What do you see as advantages of reducing your single use plastics while on campus? Select all that apply

() Reduced landfill waste

() Reduced litter

() Reduced ecological impact

() Reduced Greenhouse gasses

() Other

9. What do you see as disadvantages/inconveniences/hassles of reducing your single use plastics while on campus? Select all that apply

() Purchasing cost of reusable alternatives

() Carrying around reusable alternatives

() Remembering reusable alternatives

() Maintaining and cleaning reusable alternatives

() Other

10. Please list any factors or circumstances that would make it easier for you to reduce your single use plastics while on campus. Select all that apply

() Reusable take-out program

() Increased education/awareness

() More dine-in facilities

() Selling affordable reusable options on campus

() Other

11. Please list any factors or circumstances that currently make it difficult for you to reduce your single use plastics while on campus. Select all that apply

() Safety concerns surrounding COVID

() Lack of education/awareness

() Other

Appendix 3- Survey Questions: Composting

1. I believe composting my organics waste is

(1) Not Important to (7) Important

2. Most people around me would approve of me composting my organics waste

(1) Disagree to (7) Agree

3. I compost my organics waste while at home (the place I reside the most)

(1) Never to (7) Often

4. Most students at York University compost their organics waste while on campus

(1) Disagree to (7) Agree

5. I am confident that I am able to compost my organics waste while on campus

(1) Disagree to (7) Agree

6. The ability to compost my organics waste is up to me

(1) Disagree to (7) Agree

7. I intend to compost my organics waste while on campus

(1) Disagree to (7) Agree

8. In the past, I have composted my organics waste while on campus

(1) Disagree to (7) Agree

9. While on campus, I choose a restaurant based on its accessibility to a composting bin

(1) Disagree to (7) Agree

10. I am confident that I know what goes in the composting bins/outdoor digesters on campus

(1) Disagree to (7) Agree

11. I am confident that I know where the composting bins/outdoor digesters are on campus

(1) Disagree to (7) Agree

12. Organics waste collection is only available to faculty. This is because student facing green bins become too contaminated with non-compostable litter. What do you propose as a solution? Select all that apply

() Implement student facing green bins and educate students to decrease contamination

() Implement student facing green bins and have better signage

() Implement green bins in food service areas that are staffed by a knowledgeable employee to sort waste for students.

() Implement a community-based composting program without the need for a third-party collection service

() Keep the outdoor composting bins/digesters that students can choose to take their organics to

() Other

13. What do you see as advantages of reducing your organics waste while on campus? Select all that apply

() Reduced greenhouse gases

() Reduced landfill waste

() Other

14. What do you see as disadvantages/inconveniences/hassles of reducing your organics waste while on campus? Select all that apply

() Inaccessibility of compost bins

() Lack of education/awareness

() Disgust

() Other

15. Please list any factors or circumstances that would make it easier for you reduce your organics waste while on campus. Select all that apply

() Increased education/awareness

() Added locations of compost bins

() Other

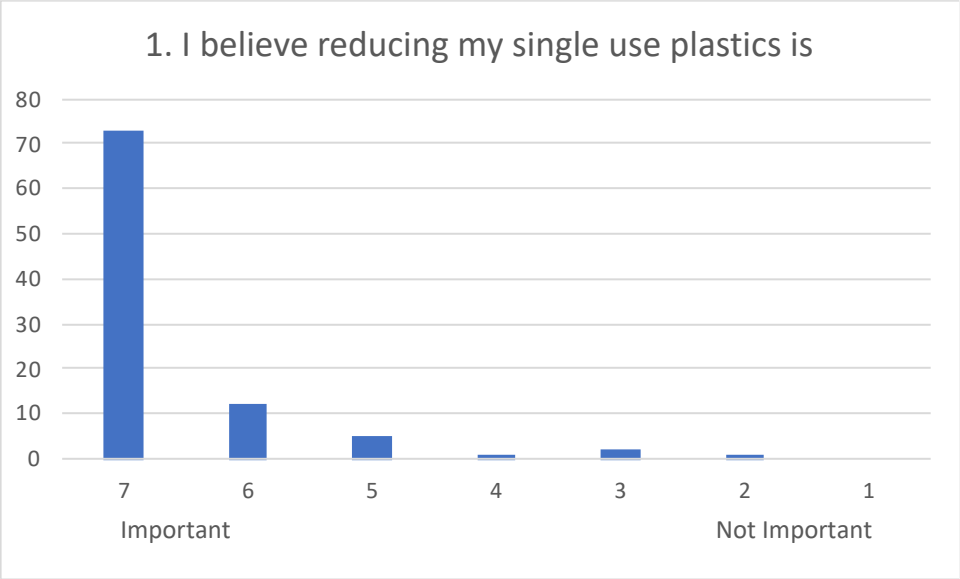
16. Please list any factors or circumstances that make it difficult for you to reduce your organics waste while on campus. Select all that apply

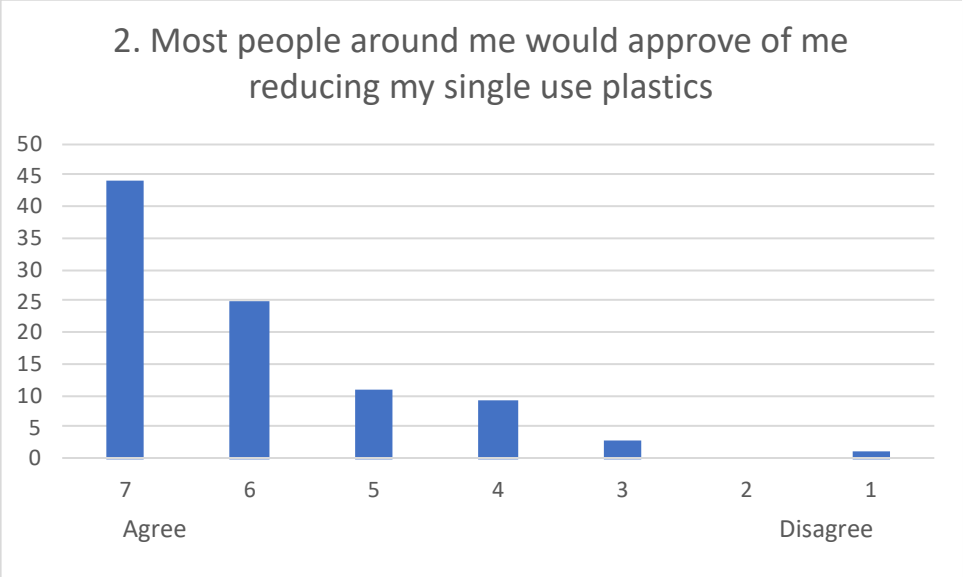
() Don’t know the location of the composting bins

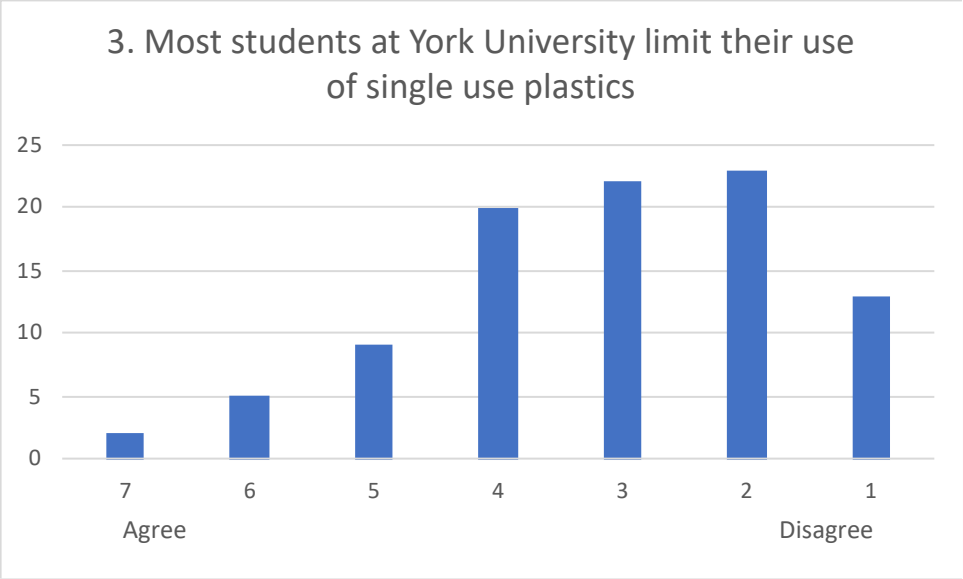
() Don’t know what goes in the composting bins

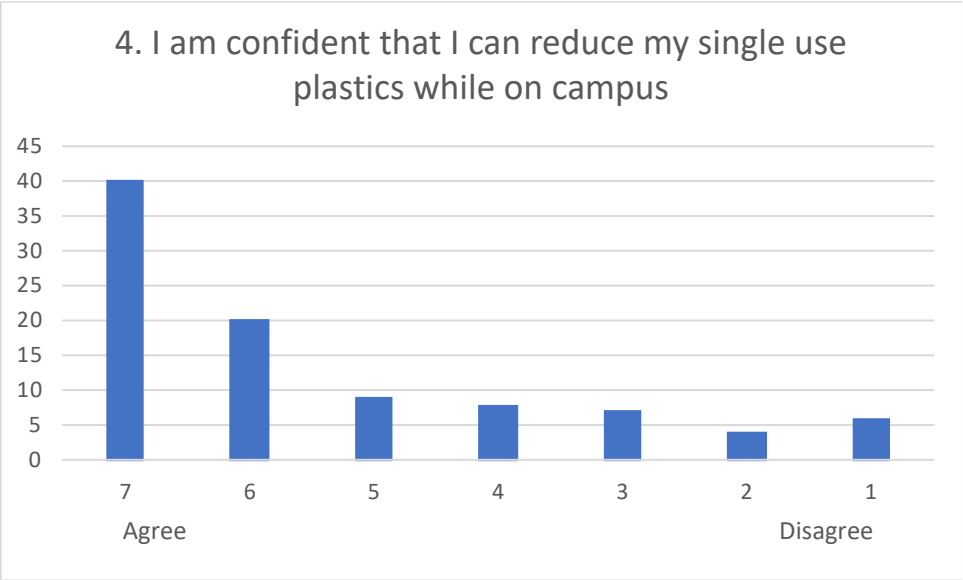
() Other

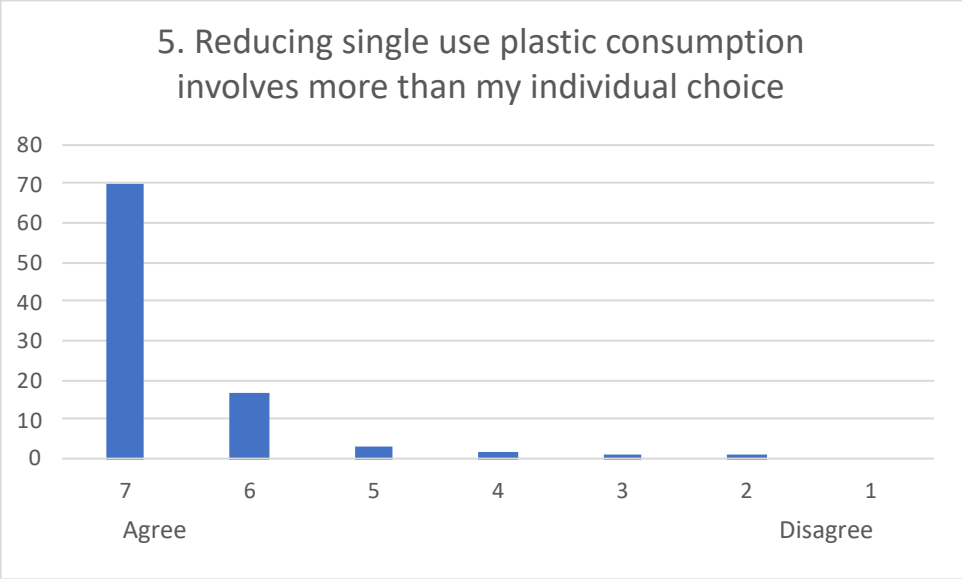
Appendix 4- Survey Response Data: Single Use Plastics

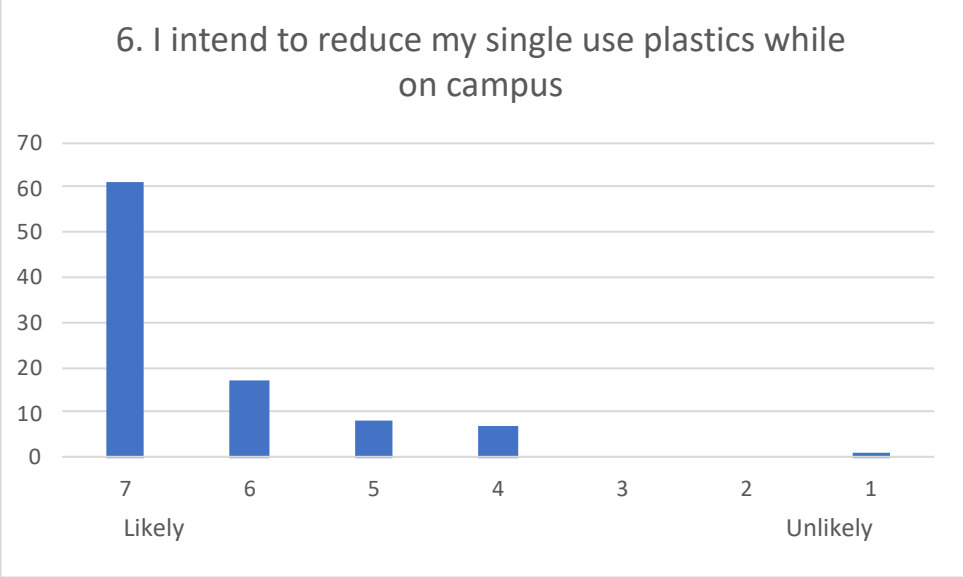


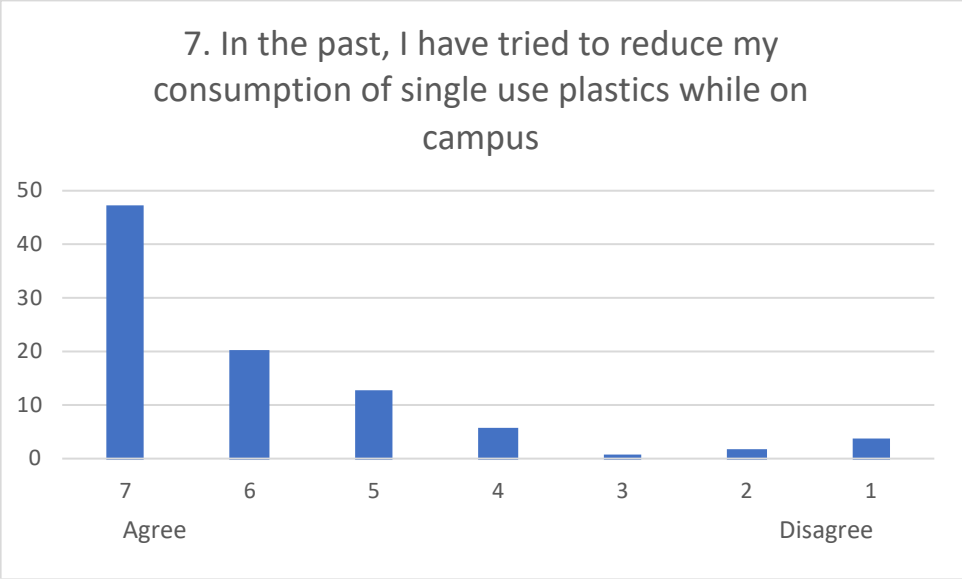


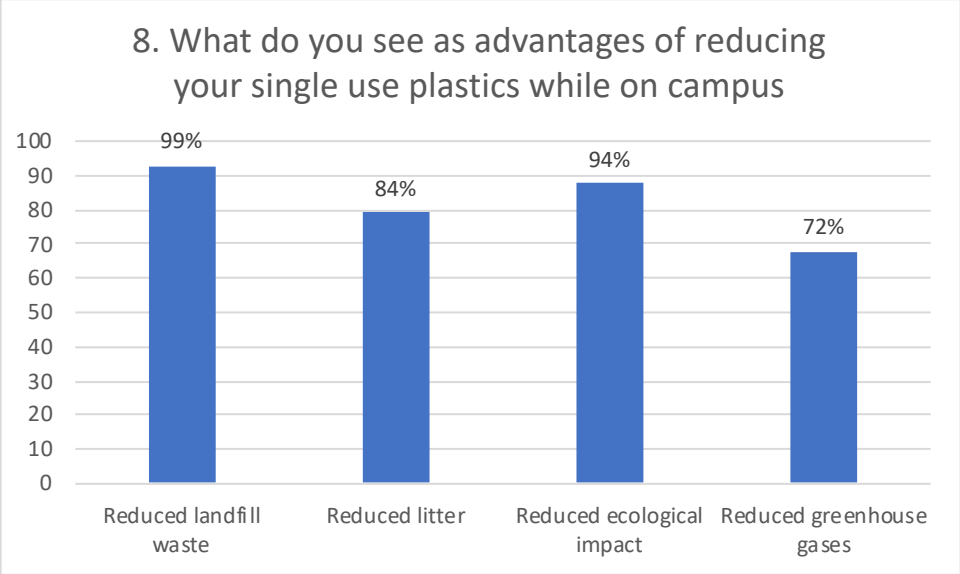

3. Most students at York University limit their use of single use plastics
25
20
15
10
5
0
7
6
5
4
3
2
1
Agree
Disagree

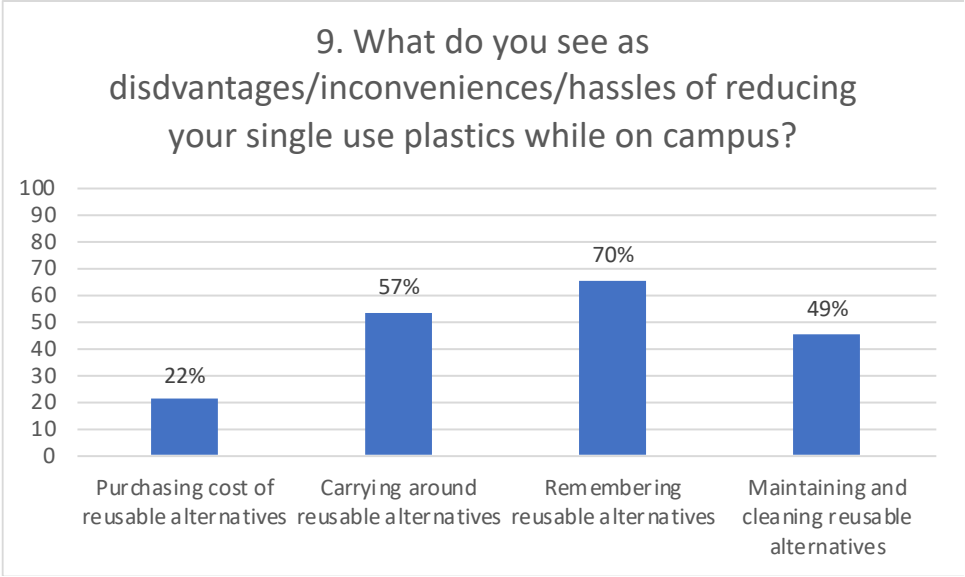

4. I am confident that I can reduce my single use plastics while on campus
45
40
35
30
25
20
15
10
5
0
7
6
5
4
3
2
1
Agree
Disagree

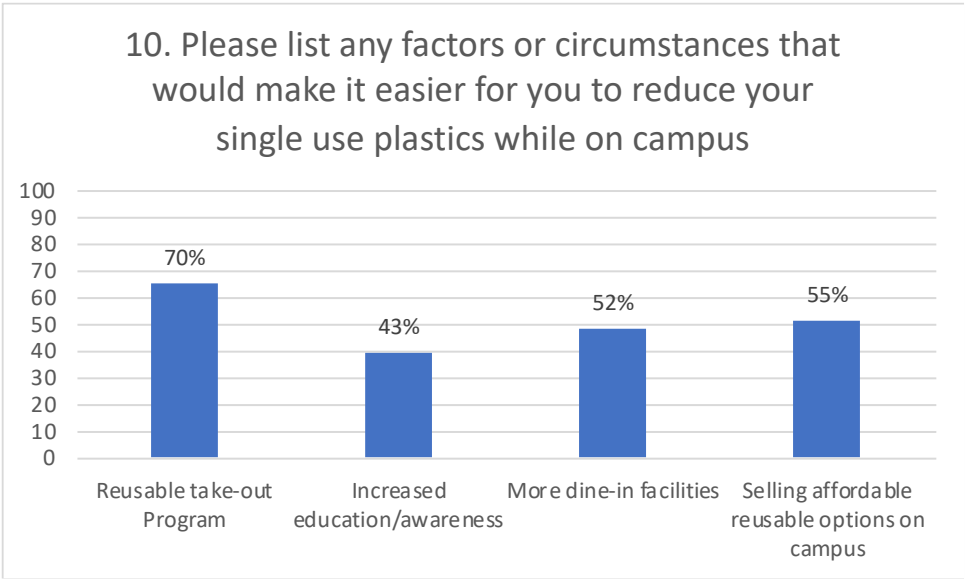

5. Reducing single use plastic consumption involves more than my individual choice
80
70
60
50
40
30
20
10
0
7
6
5
4
3
2
1
Agree
Disagree

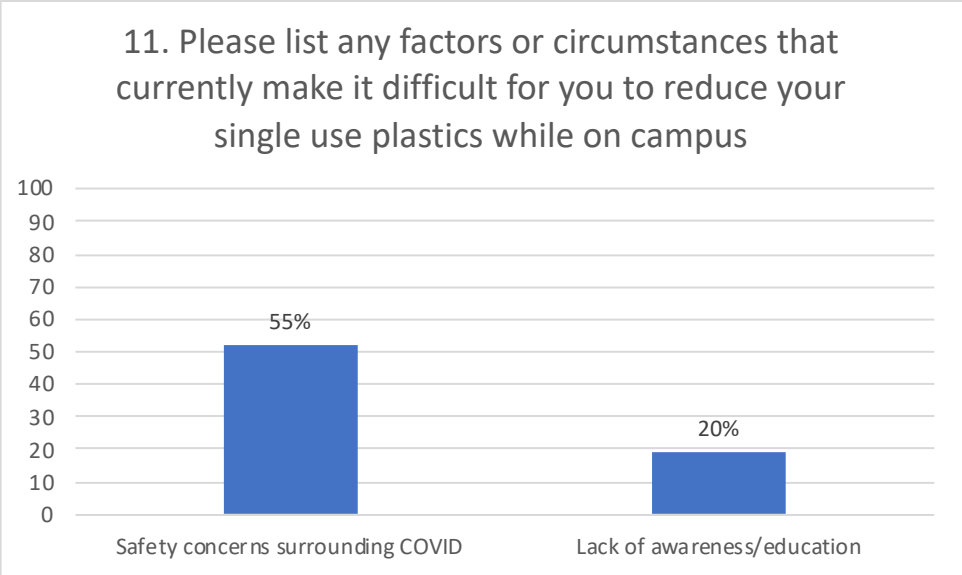

6. I intend to reduce my single use plastics while on campus
70
60
50
40
30
20
10
0
7
6
5
4
3
2
1
Likely
Unlikely


7. In the past, I have tried to reduce my consumption of single use plastics while on campus
50
40
30
20
10
0
7
6
5
4
3
2
1
Agree
Disagree

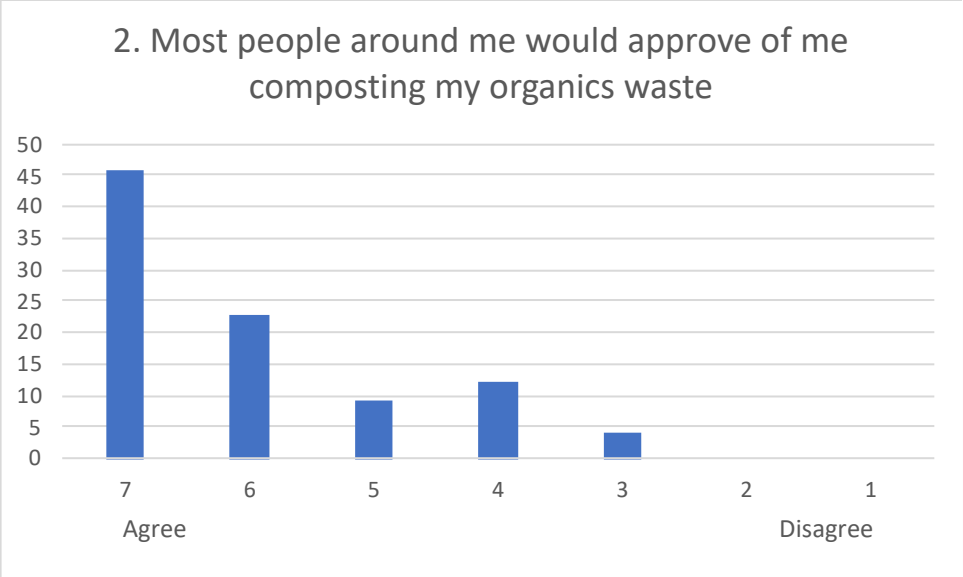

8. What do you see as advantages of reducing your single use plastics while on campus
100
90
80
70
60
50
40
30
20
10
0
99%
84%
94%
72%
Reduced landfill waste
Reduced litter
Reduced ecological impact
Reduced greenhouse gases

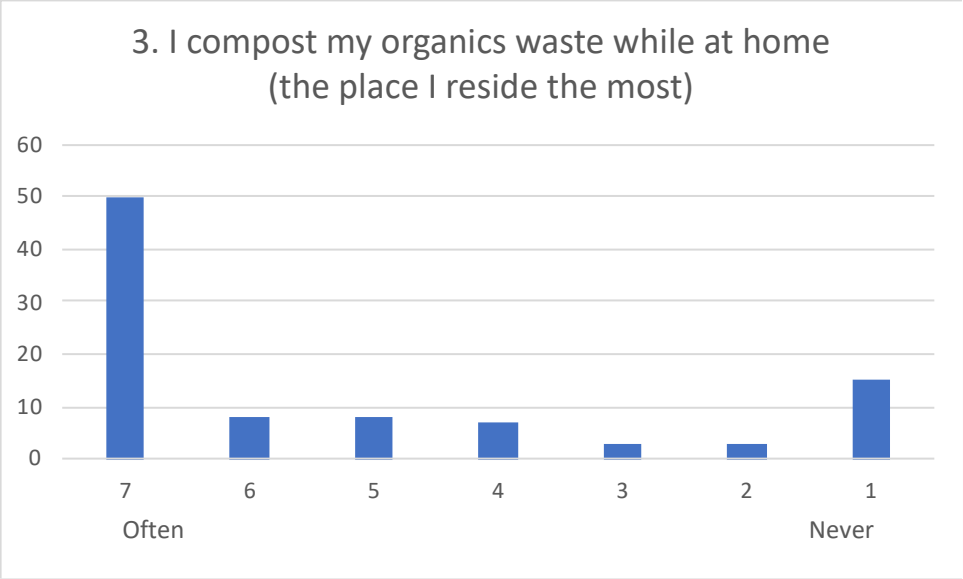

9. What do you see as disdvantages/inconveniences/hassles of reducing your single use plastics while on campus?
100
90
80
70
60
50
40
30
20
10
0
22%
57%
70%
49%
Purchasing cost of reusable alternatives
Carrying around reusable alternatives
Remembering reusable alternatives
Maintaining and cleaning reusable alternatives

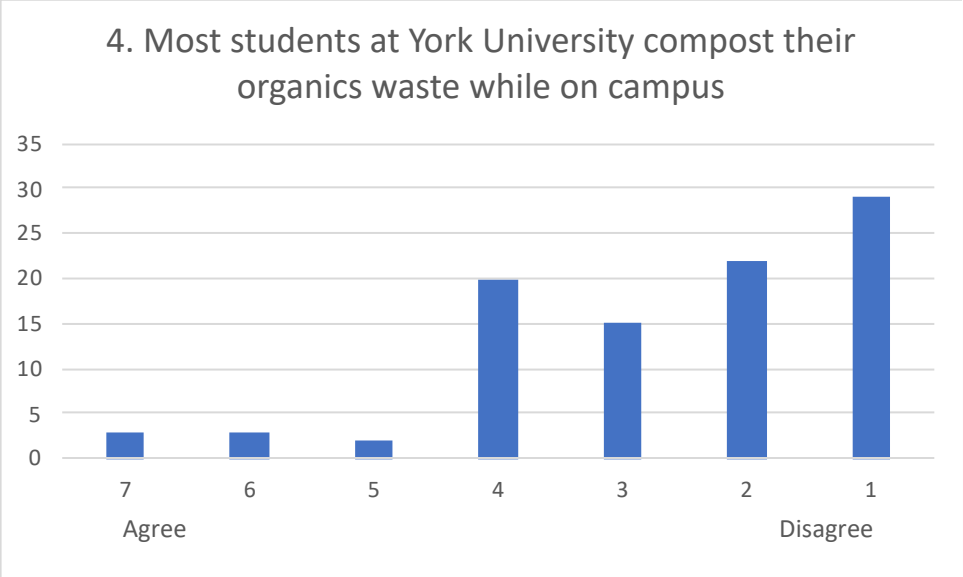

10. Please list any factors or circumstances that would make it easier for you to reduce your single use plastics while on campus
100
90
80
70
60
50
40
30
20
10
0
70%
43%
52%
55%
Reusable take-out Program
Increased education/awareness
More dine-in facilities
Selling affordable reusable options on campus

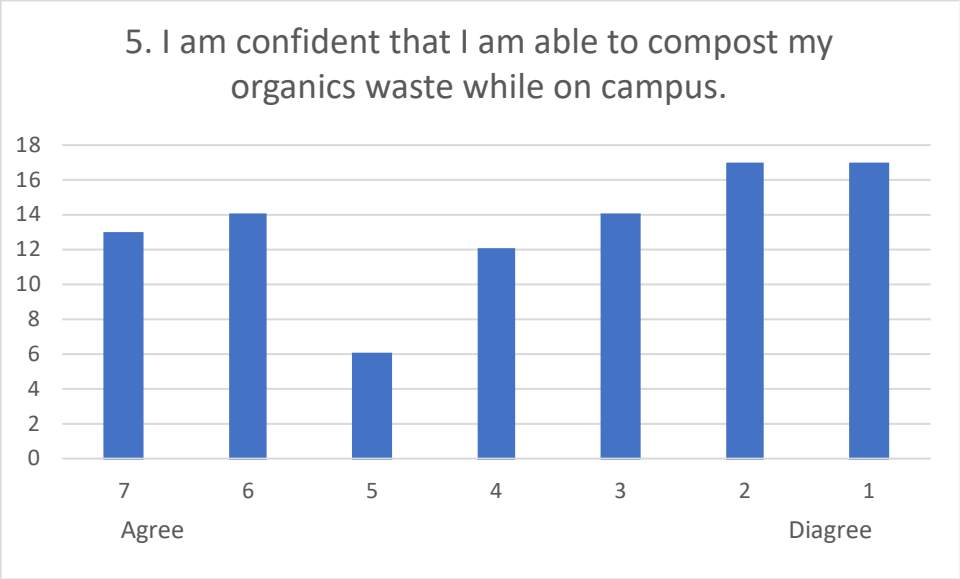

11. Please list any factors or circumstances that currently make it difficult for you to reduce your single use plastics while on campus
100
90
80
70
60
50
40
30
20
10
0
55%
20%
Safety concerns surrounding COVID
Lack of awareness/education

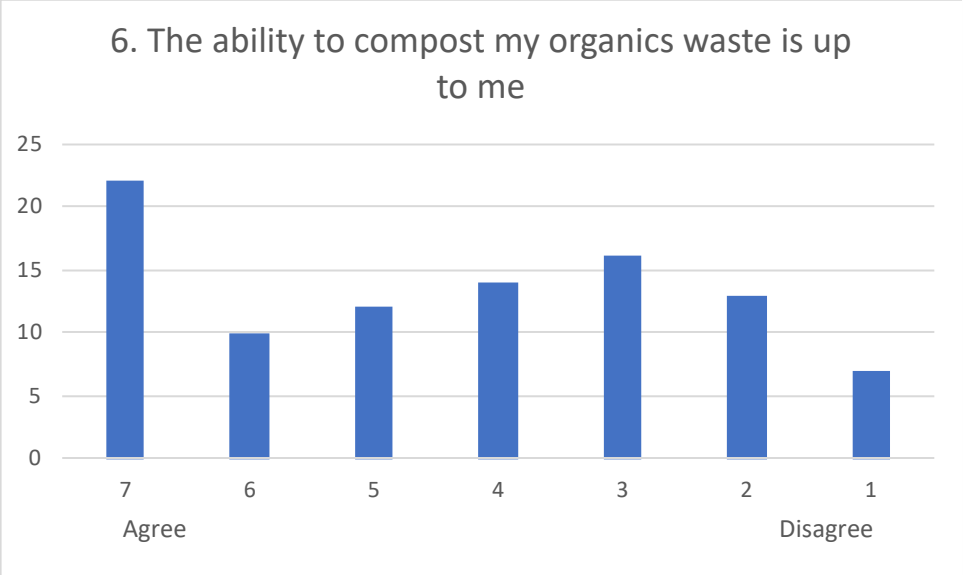
Appendix 5- Survey Response Data: Composting

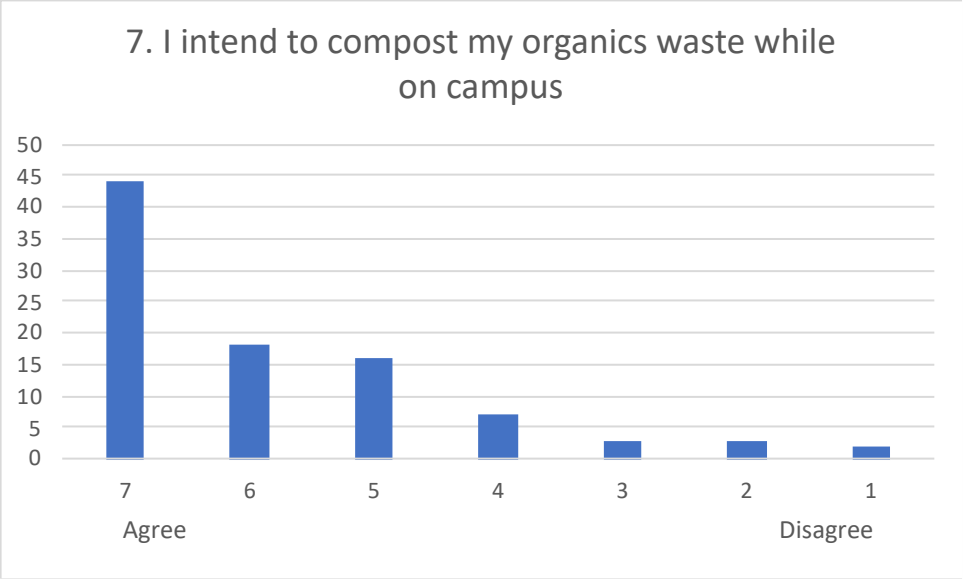


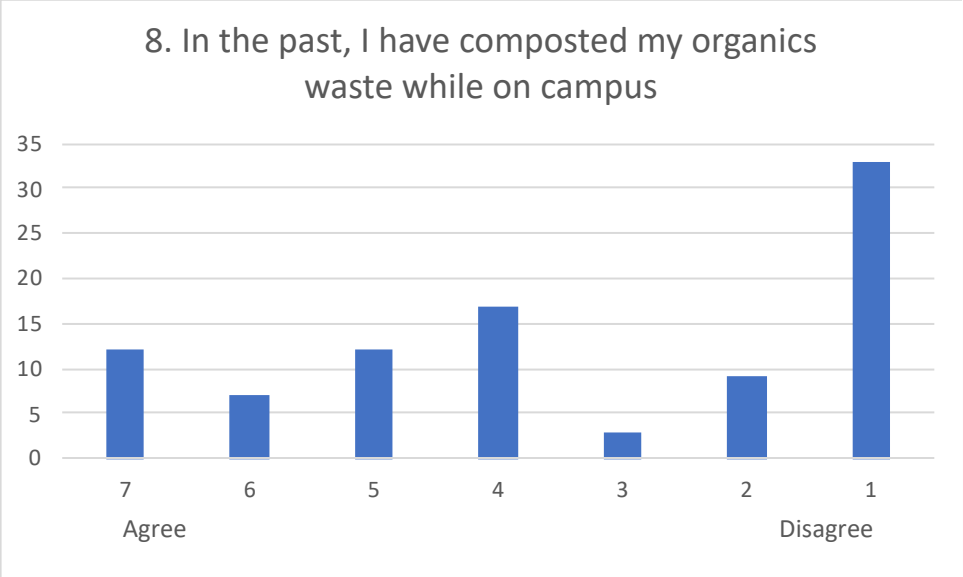

3. I compost my organics waste while at home (the place I reside the most)
60
50
40
30
20
10
0
7
6
5
4
3
2
1
Often
Never

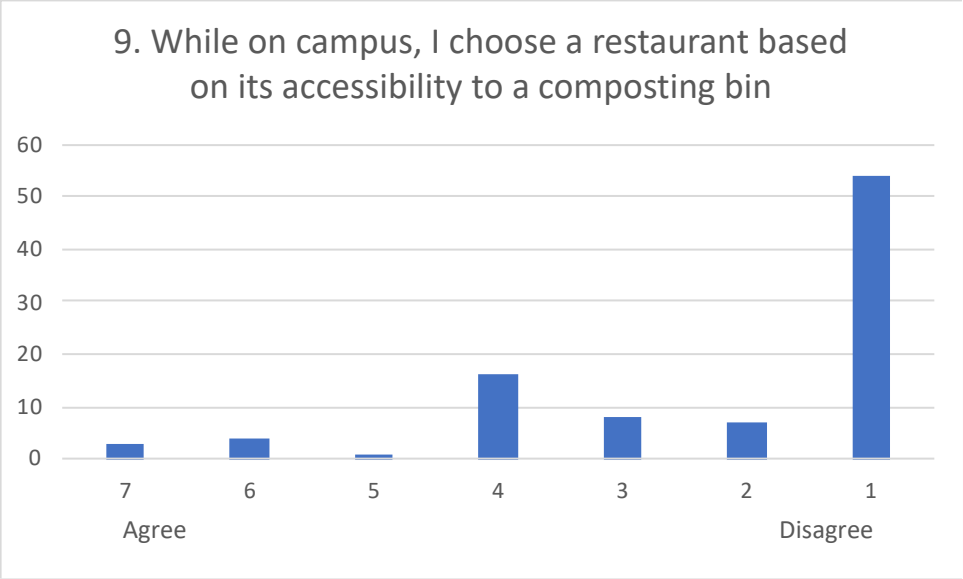

4. Most students at York University compost their organics waste while on campus
35
30
25
20
15
10
5
0
7
6
5
4
3
2
1
Agree
Disagree

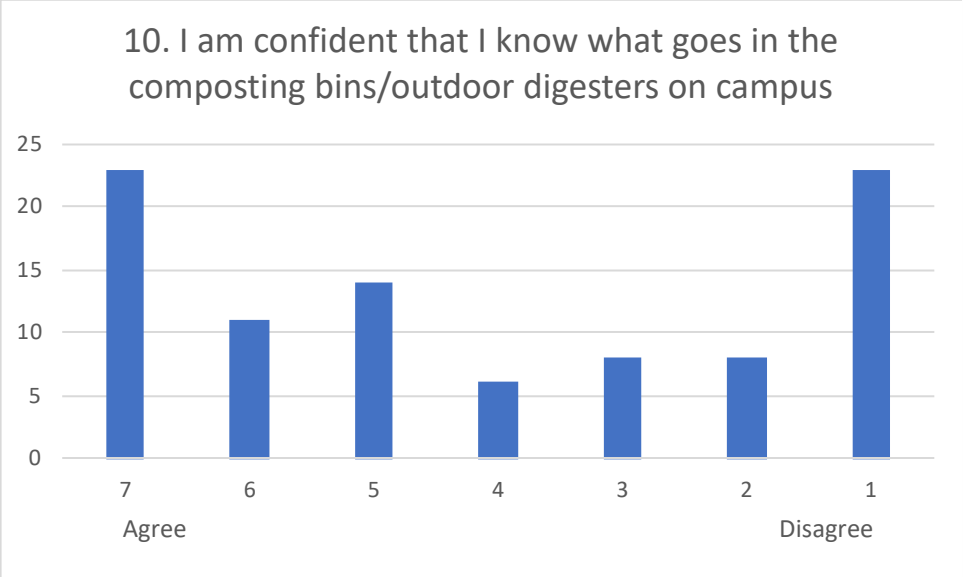

5. I am confident that I am able to compost my organics waste while on campus.
18
16
14
12
10
8
6
4
2
0
7
6
5
4
3
2
1
Agree
Diagree

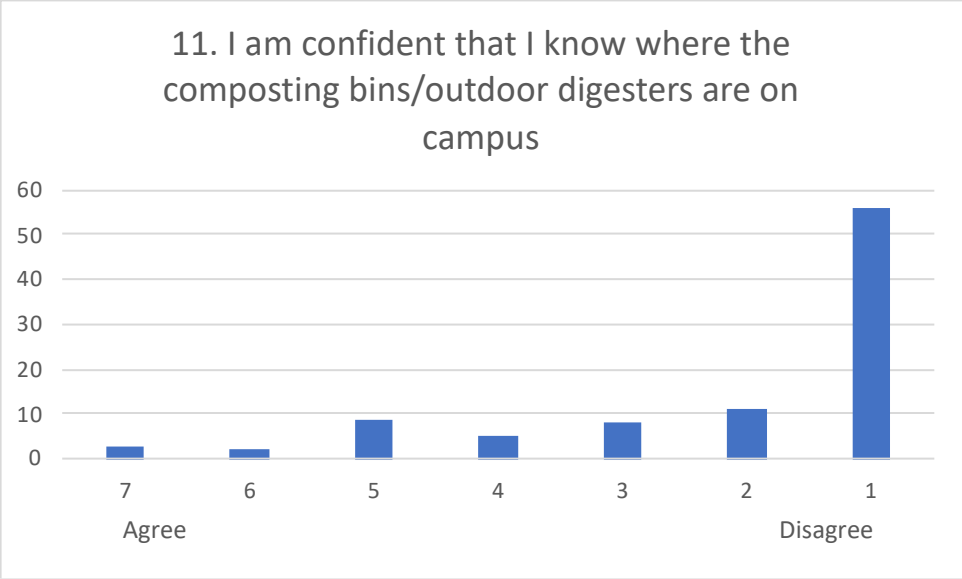

6. The ability to compost my organics waste is up to me
25
20
15
10
5
0
7
6
5
4
3
2
1
Agree
Disagree

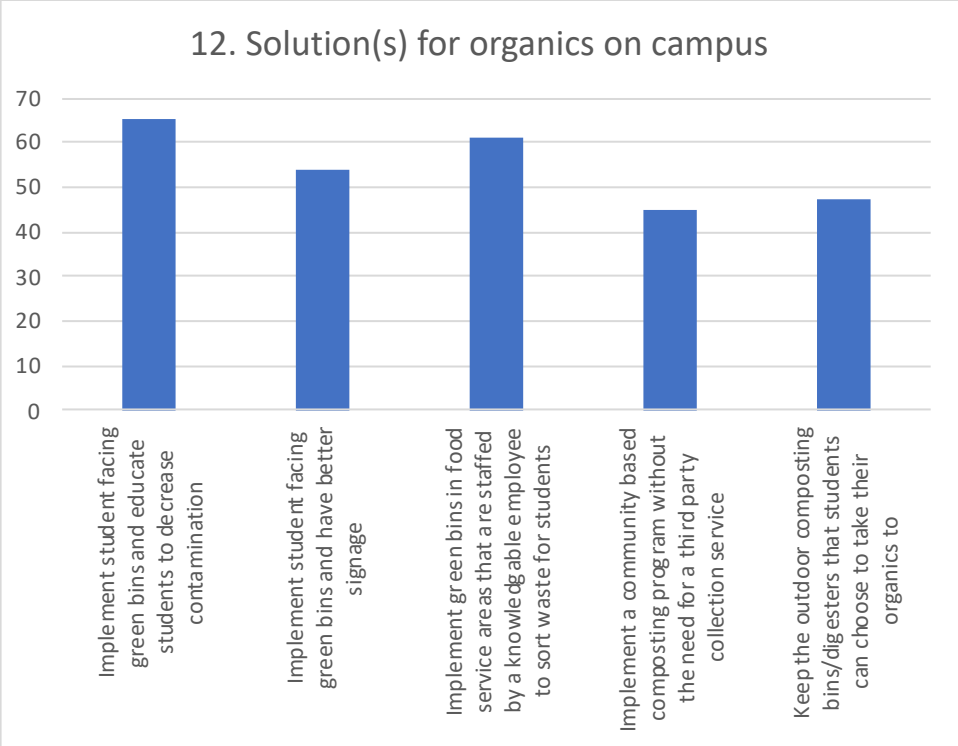

7. I intend to compost my organics waste while on campus
50
45
40
35
30
25
20
15
10
5
0
7
6
5
4
3
2
1
Agree
Disagree

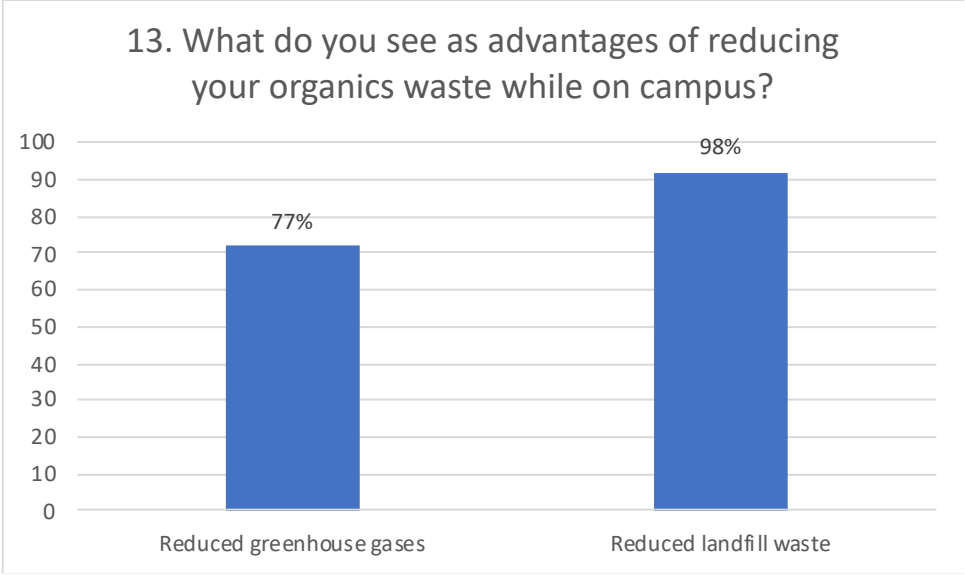

8. In the past, I have composted my organics waste while on campus
35
30
25
20
15
10
5
0
7
6
5
4
3
2
1
Agree
Disagree

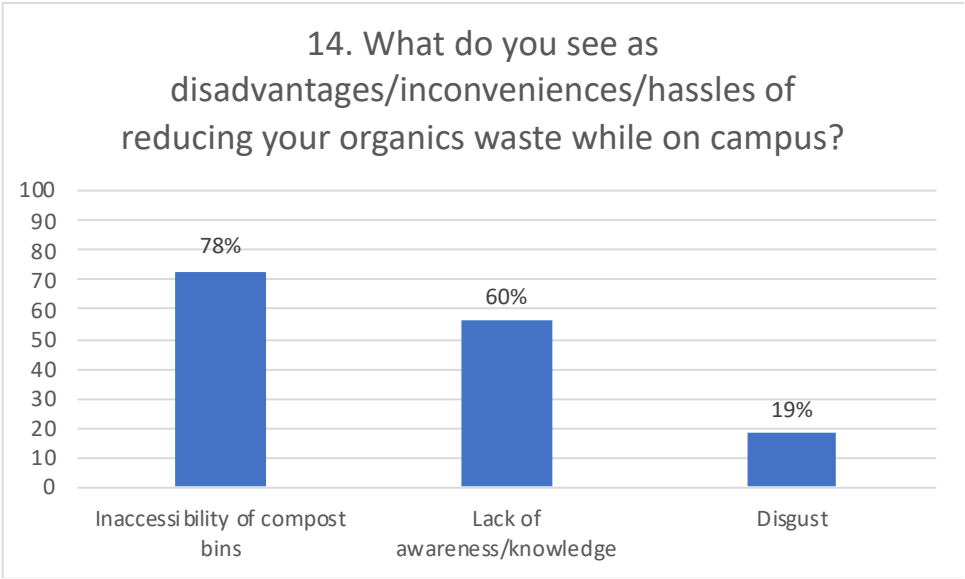

9. While on campus, I choose a restaurant based on its accessibility to a composting bin
60
50
40
30
20
10
0
7
6
5
4
3
2
1
Agree
Disagree

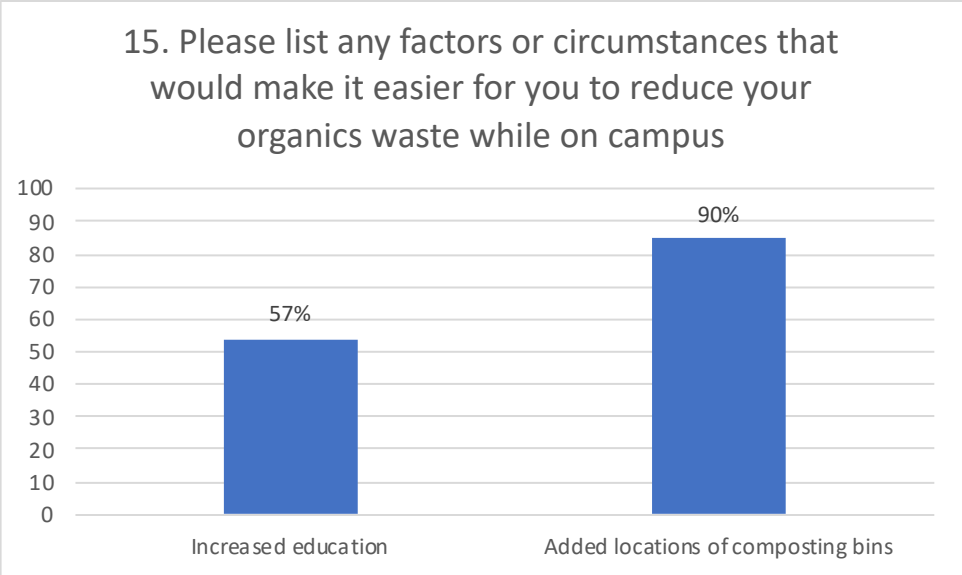

10. I am confident that I know what goes in the composting bins/outdoor digesters on campus
25
20
15
10
5
0
7
6
5
4
3
2
1
Agree
Disagree

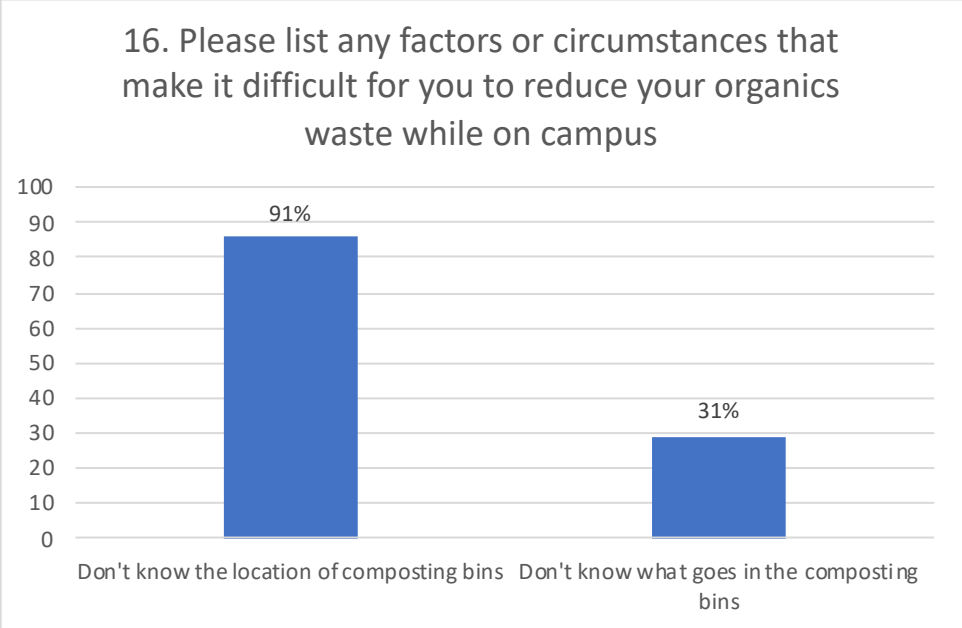

11. I am confident that I know where the composting bins/outdoor digesters are on campus
60
50
40
30
20
10
0
7
6
5
4
3
2
1
Agree
Disagree


12. Solution(s) for organics on campus
70
60
50
40
30
20
10
0
Implement student facing green bins and educate students to decrease contamination
Implement student facing green bins and have better signage
Implement green bins in food service areas that are staffed by a knowledgable employee to sort waste for students
Implement a community based composting program without the need for a third party collection service
Keep the outdoor composting bins/digesters that students can choose to take their organics to

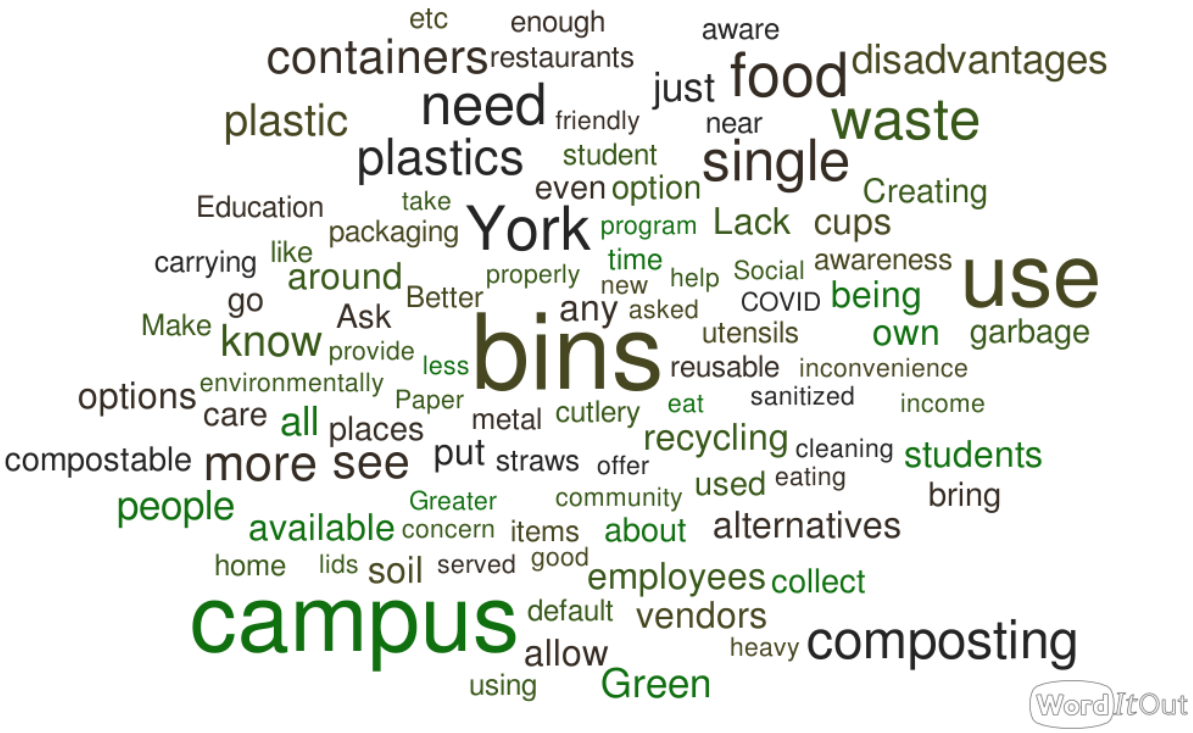

13. What do you see as advantages of reducing your organics waste while on campus?
100
90
80
70
60
50
40
30
20
10
0
77%
98%
Reduced greenhouse gases
Reduced landfill waste


14. What do you see as disadvantages/inconveniences/hassles of reducing your organics waste while on campus?
100
90
80
70
60
50
40
30
20
10
0
78%
60%
19%
Inaccessibility of compost bins
Lack of awareness/knowledge
Disgust

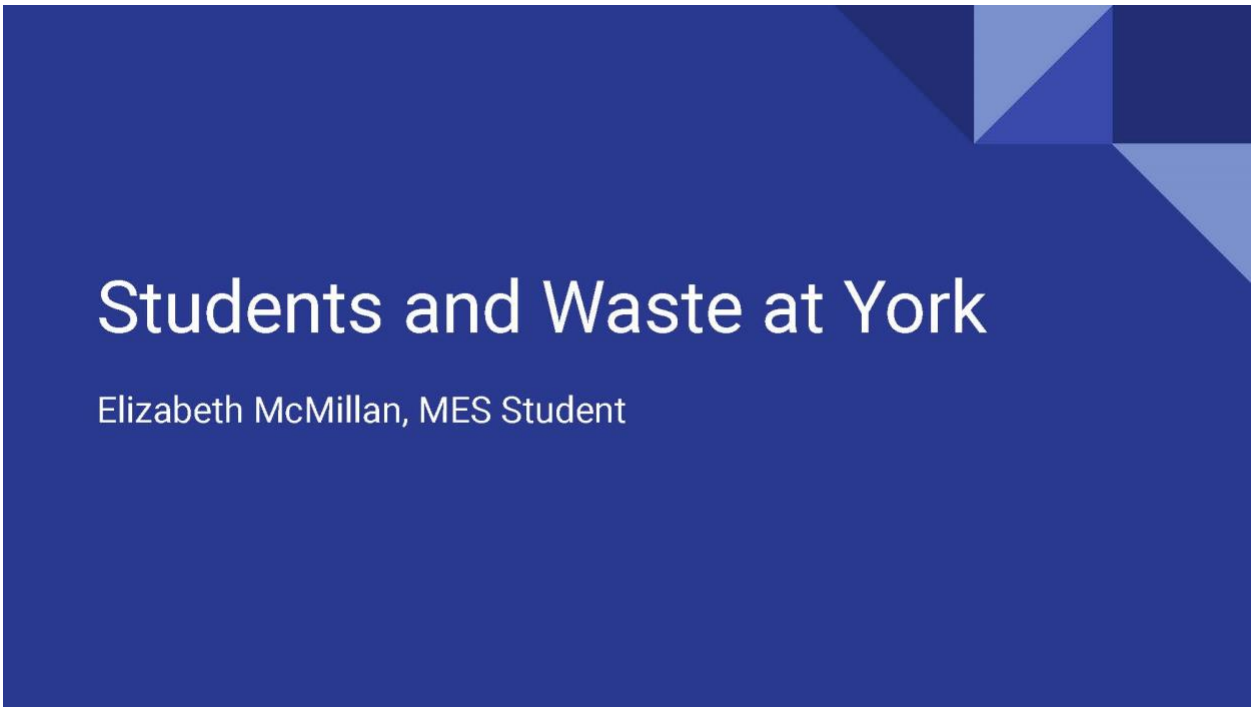

15. Please list any factors or circumstances that would make it easier for you to reduce your organics waste while on campus
100
90
80
70
60
50
40
30
20
10
0
57%
90%
Increased education
Added locations of composting bins

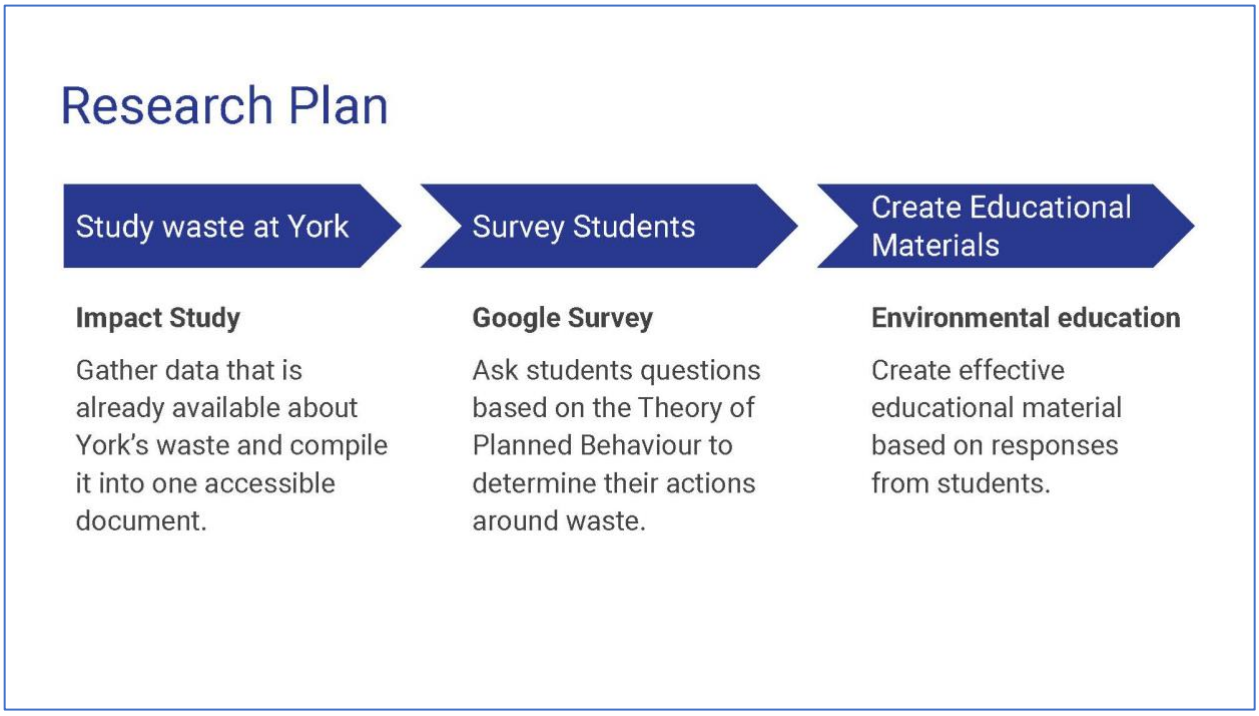

16. Please list any factors or circumstances that make it difficult for you to reduce your organics waste while on campus
100
90
80
70
60
50
40
30
20
10
0
91%
31%
Don't know the location of composting bins
Don't know what goes in the composting bins

Appendix 6- Survey Response Data: Fill in the Blank Word Cloud



Appendix 7- Presentation to relevant York division Managers as Environmental Education





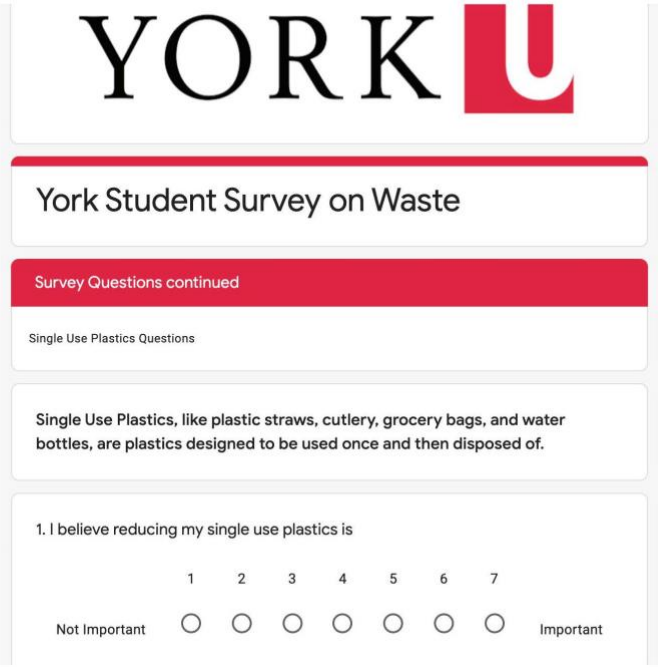
Theory of Planned Behaviour

Attitude	Subjective Norms	Perceived Behavioural Control
Salient Beliefs Likely consequences	Normative Beliefs Others' preferences	Belief in having necessary resources Opportunity to perform successfully Key indicator in predicting intention and behavior

Student Survey

5 Sections

1. Consent Form
2. Demographic questions
3. Single Use Plastics
4. Composting
5. Education Material



YORK U

York Student Survey on Waste

Survey Questions continued

Single Use Plastics Questions

Single Use Plastics, like plastic straws, cutlery, grocery bags, and water bottles, are plastics designed to be used once and then disposed of.

1. I believe reducing my single use plastics is

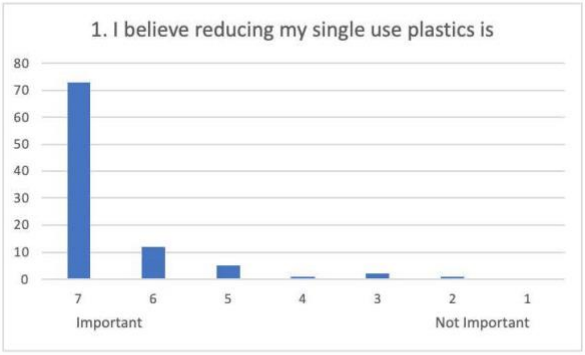
	1	2	3	4	5	6	7	
Not Important	○	○	○	○	○	○	○	Important

Survey Results

Metadata

- 94 responses
  - 5 live on campus
- 29% respondents in Faculty of Environmental and Urban Change- highest
- 2% respondents in Osgoode Hall Law School- lowest
- 14% respondents have never attended in person classes
- 55% respondents age 18-24
- 18 Ranking questions
- 9 Multiple select with fill in the blank

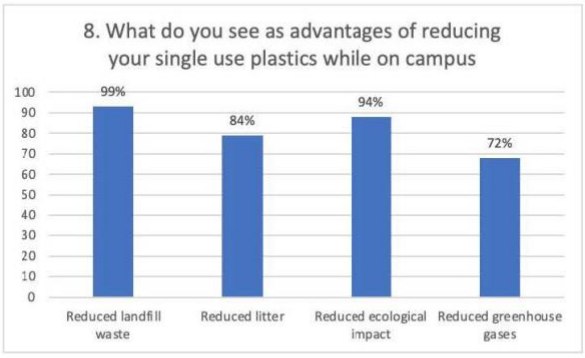
Questions with highest agreeance



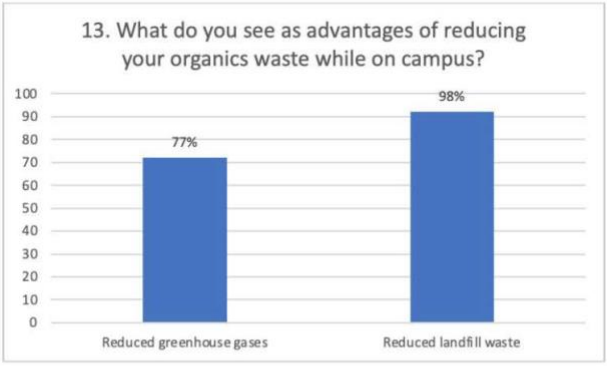
73 Important

72 Important

Questions with highest agreeance

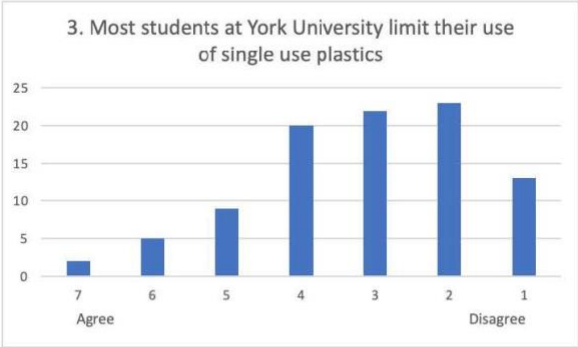


93 Reduced landfill waste

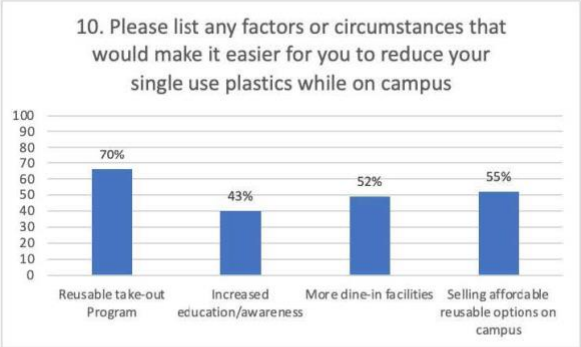


92 Reduced landfill waste

Noteworthy data

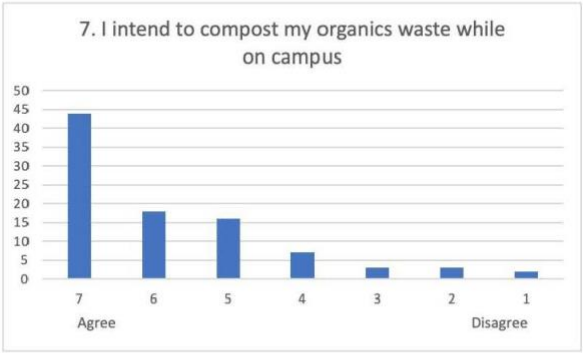


78 responded 4 or lower

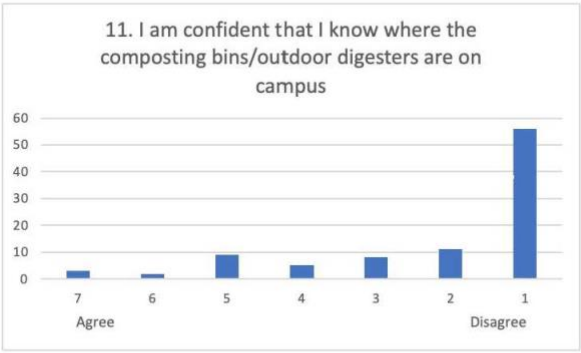


Reusable takeout program favored

Noteworthy data

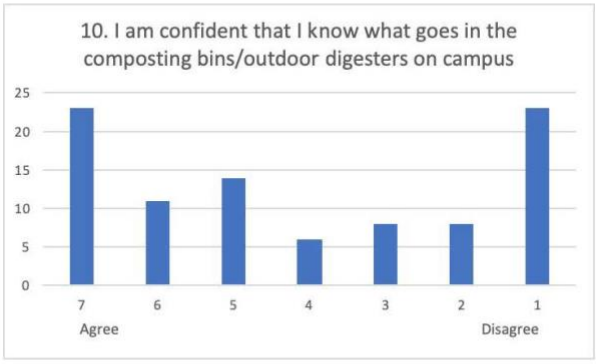


Most intend to compost

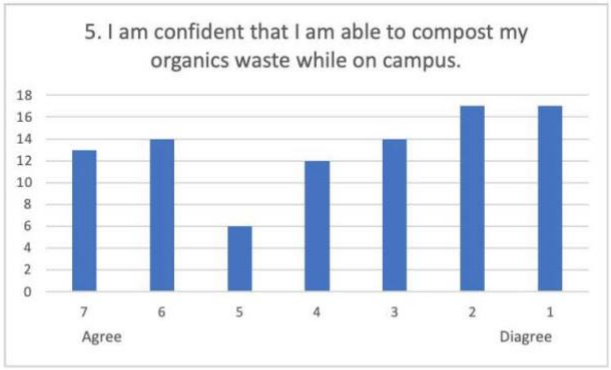


Most don't know where to compost

Least agreeance

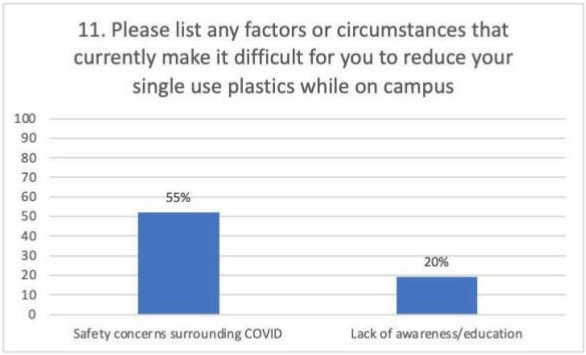


Bi-modal. 23 responded 7 and 1



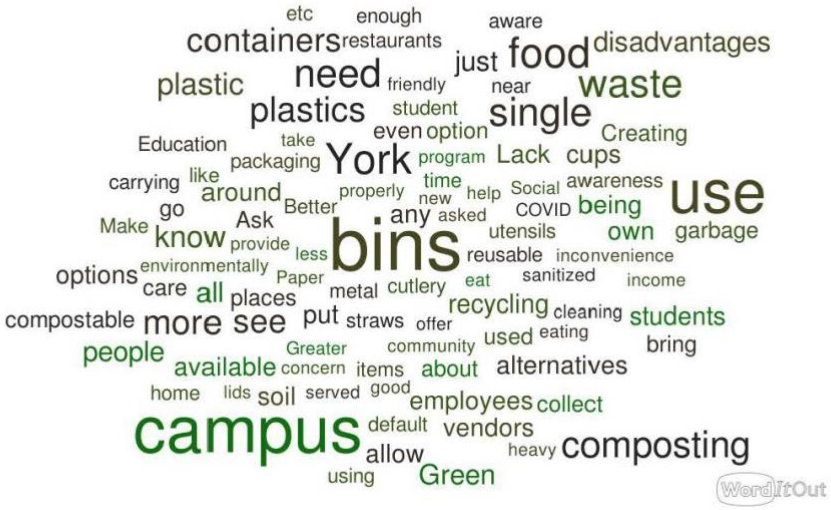
17 responded 1, 13 responded 7

Fill in the blank responses



Most fill in the blank responses- 28

Fill in the blank responses



01	Change in campus operations	• Alternatives needed (single use plastic is default) - 12 • Employee - 8 • Allowing own containers - 5
02	Personal Reasons	• Accessibility - 13 • Health/Sanitation - 6 • Peace of mind/Mindfulness - 3 • Misc - 3
03	Increased Education	• Signage/Awareness program - 16 • Student behaviours - 6
04	Organics	• Green bins needed - 8 • Composting/nutrient benefits - 7
05	Miscellaneous	• No issues or disadvantages seen - 6 • Producer responsibility - 4 • Environmental reasons - 3

Discussion and Suggestions

Access
Make composting bins easier to access
Have access to more sustainable, reusable options

Education
Teach students where and what to compost
Increase signage about composting

Operations
Do not have single use plastics as the default
Allow students to bring reusables

Discussion and Suggestions

"A University-Wide Challenge to Contribute to the UN Sustainable Development Goals"

Environmental Education Materials

Promoting Student Survey

Partnered with the Office of Sustainability

Included in This Week @ York

Based on data from Impact Study

Last section of the survey- did not want to sway their responses

Students could save this for future reference

Examples

York specific waste fact to add context

Use inclusive language- our, us, we

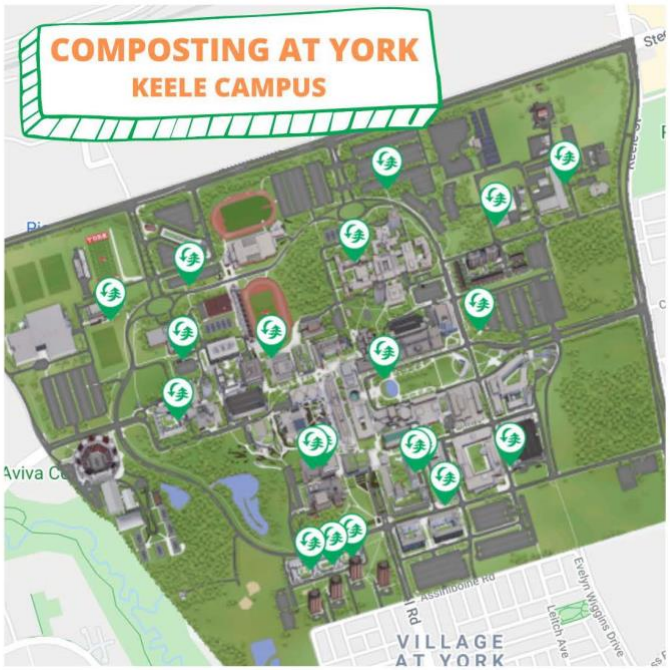
Examples cont.

Introducing composting bins

Know what to throw

Examples cont.

Know where to throw



Appendix 8- Environmental education material presented upon completion of the survey