# BUILDING A CIRCULAR ECONOMY <br> 2023 CIRCULAR ECONOMY AMBASSADOR PROGRAM REPORT 

## MIND YOUR PLASTIC

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## Out of the 17,018 waste items collected, 74\% were plasticbased, and nearly $90 \%$ of these items had the potential for recycling.



## EXECUTIVE SUMMARY

Mind Your Plastic (MYP) is a Canadian registered charity that focuses on promoting circularity through different programs that provide the necessary tools for municipalities, businesses, and schools to reduce waste. The mission is to eliminate plastic pollution through preventative efforts by advocating for municipal policy change, working with businesses, and delivering direct action and educational programs. MYP launched the Circular Economy Ambassador Program (CEAP) in 2021 to teach youth about the importance of circularity in resources, specifically plastics, and product consumption. Within its first year, 243 students across Canada participated and collected 6,400 waste items, of which $52 \%$ were composed of plastic material. This past school year, 2022/2023, the number of students that participated in the CEAP program was seven times greater, with a total of 1,880 students from 35 schools across Canada, and 17,018 waste items collected.

Considering that students currently compose one-sixth of Canada's population, their role in advocating and implementing a circular economy in their daily lives and within their communities is imperative. Hence, the objectives of the CEAP initiative were to:

- identify and hypothesize potential sources of litter debris present in different locations;
- provide potential alternative measures; and
- suggest recommendations for governmental officials, industries, and individuals to mitigate, and eventually eliminate waste production.

Out of the 17,018 waste items collected, $74 \%$ were plastic-based, and nearly $90 \%$ of these items had the potential for recycling. The most collected items were Cigarette Butts, Plastic Pieces, Paper and single-use Food Packaging. Waste percentages within different established location types (Shorelines, School Property, Neighbourhood, and Park), were analyzed to determine what types of waste was mostly present. The majority of the waste collected by CEAP participants came from School Properties, since it was the most convenient cleanup location for both teachers and students. When compared to other location types, School Property had the least percentage of Cigarettes Butts present possibly due to the smoking prohibition on the property, but the highest percentage of Plastic Bottles and Cups, probably because of the numerous facilities surrounding the area (community centres, stores, businesses,
etc.) and different activities that occur on school grounds. Shorelines showed a high presence of Cigarette Butts and Plastic Pieces, possibly due to group gatherings, and the lowest values in Cups, Face Masks, and Food Packaging, potentially due to the lack of supermarkets and restaurants in the near vicinity. Neighbourhoods had the second highest presence of Cigarette Butts and Plastic Pieces, potentially due to citizens fulfilling daily activities or hobbies and the improper design of residential waste bins. Park locations showed the lowest percentage of Plastic Pieces, but it had the highest presence of Food Packaging, possibly due to the lack of recycling and garbage bins and individuals that, when aggregated, allowed for both intentional or unintentional littering to occur. Essentially, most littering sources we hypothesized to be related to people's behaviours and lack of convenient bins. However, if sustainable/reusable packaging options were more readily available for the public than the materials found as litter, the waste collected could have had a different fate.

The abundance of plastic pollution negatively impacts economies, wildlife, and human health. Identification of items collected through the CEAP program was fundamental to hypothesize the waste sources and to consider sustainable alternatives to reduce waste. The program identified that the majority of the litter collected could have been recycled, hence, using waste as a resource to fuel a circular economy that produces reusable items should be more effective at eliminating waste in our environments. Additionally, the program inspired students to advocate for change within their local community by seeking municipal council and requesting single-use plastics bans. Although Canadian governments have begun to set regulations and acts to mitigate national plastic pollution, it is recommended that Canadian governments use a multi-leveled approach to reduce and mitigate plastic waste.

## We believe that combining the following actions listed below will lead to the reduction of plastic pollution:

- enhancement of public education by adding formal courses to curriculum;
- establishing effective sustainable/reusable product design and systems from industries;
- regulating the amount and type of packaging materials;
- applying rigorous litter monitoring;
- increasing littering consequences;
- expanding extended producer responsibility;
- installing effective waste disposal bins in public areas;
- providing funds to non-profit organizations and charities to enhance awareness, adjusting regulations to contain a bigger list of single-use plastic items; and
- include clear actionable steps for future mitigation and prevention plans.

We hope that by adopting these actions we will see an extensive behaviour change with how everyone, from individuals to major corporations, uses and disposes of plastics, thus leading to a reduction of plastic pollution.

> Within its first year, 243 students across Canada participated and collected 6,400 waste items, of which $52 \%$ were composed of plastic material.

## OUR 2022/2023 CLEANUPS

From coast to coast, schools from eleven
provinces and territories conducted cleanups!


## WHAT ARE THE ISSUES?

> The commercial demand for plastic products has increased production by $239 \%$, from producing 1.5 million metric tonnes of plastics in the 1950s, to producing 359 million metric tonnes in 2018 (Filho et al., 2021).

Throughout its production and at the end of its life, plastics pollute our environment, due to resource extraction and inappropriate waste management from both industries and individuals. The efficient production of this material comes at a high cost after it is inserted into our economy. Plastic waste recycling lags far behind its production, as only about $30 \%$ of global plastics are recycled, reused and/or incinerated, while the other $70 \%$ is discarded and can eventually land in different natural environments (Geyer et al., 2017).
The physical properties that have made plastic a commercial staple material, such as being lightweight, of high durability, and inexpensive, are the same properties that negatively impact ecosystems as it persists both in its original form and slowly degrades, releasing toxins into habitats (Filho et al., 2021).

Plastic can remain in both terrestrial and aquatic environments for thousands of years, negatively impacting economies, microscopic and macroscopic wildlife, and human health (Stevens, 2022; UNEP, 2017). Plastic pollution affects economies as it interferes with commercial fisheries (Nash, 1992), decreases ecotourism through waste presence within destination landscapes (Jang et al., 2014), and increases the requirement of costly cleanup initiatives (UNEP, 2014), amongst other issues that affect all levels of government. Wildlife is also impacted by plastic litter through ingestion, which causes digestive blockage and absorption of toxins, and entanglement, which can decrease animal fitness, and habitat destruction. All of these increase the likelihood of animal mortality (ECCC, 2020). Furthermore, since ingestion of plastic particles has been found within animals at the bottom of the food chain, such as copepods, as well as top predators, such as tuna, whales, and sharks, the bioaccumulation and biomagnification of plasticbased toxins is already present in the marine food chains (Karami et al., 2017). This results in a negative effect on human health, as it is estimated that humans consume 112 to 842 microplastic particles per year through fish consumption (Barboza et al., 2020). The current linear economy concept extracts, uses, and then disposes of materials, which is continuously putting pressure
on our natural systems, communities, and public health. A circular economy could potentially significantly reduce waste, by transforming it into a reusable resource.


## CURRENT GOVERNMENTAL ACTIONS

## Currently, the government of Canada has several federal acts that focus on the prohibition and prevention of waste being deposited within marine and terrestrial environments (Linnebjerg et al., 2021).

The Microbeads in Toiletries Regulations (2017) is reducing plastic pollution as it has banned the usage and manufacturing of microbeads within the cosmetic sector. The Canada-wide Strategy on Zero Plastic Waste presents the objectives that the federal government aims to reach by transforming plastic waste into a resource within a circular economy. The Arctic Waters Pollution Prevention Act (2019) was created to prohibit any type of waste from being discarded within Arctic waters or locations that may allow waste to enter the Arctic's aquatic environment. The Single-Use Plastics Prohibition Regulations (2023), prohibited the production, importation, and distribution of six single-use plastic items such as plastic cutlery, straws, shopping bags, stir sticks, food service
ware, and ring carriers (ECCC, 2023). The Canadian Environmental Protection Act (ECCC, 2019; Linnebjerg et al., 2021) is able to label certain plastics as toxic substances to monitor products. In addition, Canada was the leading country that developed the Ocean Plastic Charter (ECCC, 2021; Linnebjerg et al., 2021) which included several goals to be met by the G7 countries, such as collecting all plastics by 2040.

Although Canada has developed several acts and policies at all governmental levels, there is a lack of enforcement, monitoring, and research to increase the effectiveness of these new regulations. In addition, due to the long-range transportation of plastic waste, there is still a need for international collaboration to further eliminate, or at the very minimum, reduce plastic pollution. Furthermore, governments, industries, and individuals must unite against this major issue. Therefore, educating the next generation by implementing subjects such as waste management into their curriculum may lead to behavioural change that potentially eliminate further plastic waste in the future.

## CIRCULAR ECONOMY AMBASSADOR PROGRAM

Non-profit organizations and charities have been crucial in creating awareness of the plastic pollution crisis by teaching the public about alternatives,
organizing cleanups, and advocating for a positive shift toward eliminating plastic usage through policy change. Mind Your Plastic (MYP) is a Canadian registered charity that focuses on eliminating plastic pollution through preventative efforts by advocating for municipal policy change, working with businesses, and delivering direct action and educational programs. Considering that plastic pollution affects all living things directly and/or indirectly, MYP launched the Circular Economy Ambassador Program (CEAP) in 2021 to teach youth about the importance of circularity in resources, specifically plastics, and product consumption. Within its first year, 243 students across Canada participated and collected 6,400 waste items, of which $52 \%$ were composed of plastic material. This past school year, 2022/2023, the number of students that participated in the CEAP program was seven times greater, with a total of 1,880 students within 35 schools across Canada that have learned about the circular economy movement. According to the Collins Dictionary, a circular economy is: "an economic system based on using renewable resources, eliminating waste, and reusing and recycling material goods". In a circular economy, nothing is wasted. The circular economy reuses, repairs, refurbishes, remanufactures, repurposes, and/or recycles products and materials to be reinserted into the economy. Therefore, waste becomes a resource and circularity helps develop innovative ways to improve the environment and the economy.

## CEAP Cleanups

Today's youth are tomorrow's future. Since youth from the age of 9 to 24 compose approximately one-sixth of Canada's population (Statistics Canada, 2022), their role in advocating and implementing a circular economy in their daily lives and within their communities is imperative. As students collected data, sorted waste, recycled materials and concluded the CEAP program, some were further inspired to advocate for change within their communities. This year, after participating in the CEAP, a group of Grade 5 and 6 students presented the plastic issue to their municipal council members, requesting a bylaw to ban and support using less single-use plastics.

Therefore, schools, teachers, students, and local communities have all benefited from the CEAP program.

MYP has made the CEAP very accessible to all students, teachers, and schools by providing complimentary physical supplies (reusable gloves, bags and t -shirts) and detailed instructions to fulfill a cleanup with participants from ages $5-18+$. MYP also provided teachers with educational materials according to the education level of participants at no cost. Teachers lead the program by conducting a cleanup with their students, collecting data, diverting waste, and sending acceptable plastics
to our recycling partners who transform waste into something new to be reinserted into the economy.

Plastic solutions are developed as the issue and its consequences are better understood. The CEAP seeks to comprehend what types of waste are constantly being introduced within the different Canadian environments, identify the sources, and provide alternative measures for governmental officials, industries, and individuals to mitigate, and eventually eliminate, waste production.


## DATA ANALYSIS


#### Abstract

Data analysis performed for the waste collected at cleanups was based on item counts and proportions within the datasheets submitted by teachers and students from participating schools: Location, Sorting and Diverting, and Data Tally Sheet.


Since not all schools provided the estimated weights for the waste collected, it was not analyzed. Further research on geographical locations was conducted through Google Maps, while calculations and data organization were fulfilled through Google Sheets. This included pivot tables and the creation of charts and visuals. Each datasheet contained different cleanup components to be recorded so that the waste collected could be analyzed.

Plastic items were categorized as all items composed of at least $50 \%$ plastic. This included Cigarette Butts as well, under the assumption that the cellulose filter remaining made up most of each item collected. Single-Use Items were categorized as non-refillable (e.g. lip balm) or non-reusable (e.g. diapers) items. Objects with an unspecified purpose but a high probability of being single-use were also included, such as food packaging, while
those that were more vague, like "chopsticks", were excluded. Reusable Items were more frequently or permanently used or had a high chance of being donated or upcycled for better use (e.g. clothes). Anything that was not clearly in either category was classified as Inapplicable (e.g. banana peel).

After completing the cleanups, teachers were instructed to discuss with their students what actions could be taken to prevent debris from accumulating in our environments again.

The hands-on experience that the CEAP provides has inspired students to advocate for better waste management, single-use source reductions, and shifting to reusable materials, within their municipalities in the past two years. This past year, one school from Port Hope, Ontario collected such a high quantity of single-use plastics that they created a presentation of their results for the Port Hope Council. The students advocated to enact a bylaw to ban and support decreasing the usage of these types of plastics. After their presentation, councillors unanimously passed the motion to have the Environmental Advisory Committee search for a bylaw concerning single-use-plastic usage. Our hope is that as their awareness of plastic pollution grows, the younger generation will feel more compelled to seek alternatives as they search for a more permanent solution.

## WHAT WAS DISCOVERED?

After their cleanup, teachers provided MYP with their completed datasheets (Data Tally Sheet, Location, and Sorting and Diverting). Out of the 35 schools (1,880 participants) that participated and conducted a cleanup in the 2022/2023 program, only 28 (1,428 participants) were able to provide data due to different circumstances in the teachers' professional responsibilities. Therefore, the analyzed data reflects the data provided by the 1,428 participants. Participants recorded the count of items present in each of the categories in the Data Tally Sheet.



Percentage and number of participants in the 2022/2023 CEAP program in each participating province and territory Percentage calculation was based on a total of 1,880 participants from 35 different schools.

## WASTE ITEMS

During every cleanup in the years of 2022 and 2023, Circular Economy Ambassador Program students from ten Canadian Provinces sorted and counted waste items collected from different environments. Percentage values were calculated from the total number of items collected ( $\mathrm{N}=17,018$ ).

4.7\% Plastic Bags

2.9\% Glass FRAGMENTS - $2 \%$ BOTTLES - $0.86 \%$

3.9\% Cups
COLD DRINK - $2.5 \%$ HOT DRINK - $1.5 \%$

9.7\% Food Packaging

## TOP 10 ITEMS COLLECTED

The top ten items collected by 2022/2023 CEAP participants across the ten Canadian provinces. Total percentage was calculated from the total number of collected items: 17,018.
1.


Cigarette Butts
COUNT: 3,318 | PERCENTAGE: 19.5\%
2. 8

Plastic Pieces (0-10 cm)
COUNT: 1,797 | PERCENTAGE: 10.6\%
3.

## Paper

COUNT: 1,775 | PERCENTAGE: 10.4\%
4. 8

Food Packaging
COUNT: 1,663 | PERCENTAGE: 9.8\%
5. $\otimes$

Plastic Pieces (10-30)
COUNT: 867 | PERCENTAGE: 5.1\%
6.

Plastic Bottles
COUNT: 522 | PERCENTAGE: 3.1\%
7.

COUNT: 460 | PERCENTAGE: 2.7\%
8. $\sim$ Plastic Pieces ( $>30 \mathrm{~cm}$ )

COUNT: 459 | PERCENTAGE: 2.7\%
9.

Cold Drink Cups
COUNT: 421 | PERCENTAGE: 2.5\%
10.

Plastic Bottle Caps
COUNT: 385 | PERCENTAGE: 2.3\%

## Locations

Participants conducted cleanups in accessible locations near their school. The different areas were divided into four different location types; Shoreline, Neighbourhood, Park, and School Property. Within the different Location types, Cigarette Butts, Plastic Pieces, Commonly Found Items and Food Packaging were the most prevalent categories present.
However, Take-out Containers were inconspicuous. Item percentage of each waste category present was analyzed for each location type. School Property has the least percentage of Cigarettes Butts present, but the highest percentage of Plastic Bottles and Cups when compared to the other locations. Shorelines show a high presence of Cigarette Butts and Plastic Pieces, and the lowest values in Cups, Face Masks, and Food Packaging. However, Shorelines had the highest amount of waste diverted. Neighbourhood has the second highest presence of Cigarette Butts and Plastic Pieces. The Park locations show the lowest percentage of Plastic Pieces, but it has the highest presence of Food Packaging. Within all the location types, over 70\% of their total waste was composed of plastic!

NEIGHBOURHOOD, PARK, SCHOOL PROPERTY, AND SHORELINE

$100 \%$



Neighbourhood


Park

9,936


School Property

2,018


Shoreline

Percentage of Waste Categories within each location type. Each bar has a total value of $100 \%$ based on the total count of items within each waste category in the different location types.

Although schools from ten Canadian provinces and one territory participated, the Nunavut school did not provide waste data, hence it could not be included in the analyses. From the total percentage of items that were collected only in Newfoundland and Labrador, most of it was composed of Plastic Bottles, Miscellaneous and Plastic Pieces, but it had the lowest percentage of Food Packaging, Cups and Commonly Found Items when compared to all other provinces. New Brunswick had the highest percentage of Cans, and the lowest percentage of Face Masks. British Columbia had the highest proportion for Commonly Found

Items, and Styrofoam. Alberta has the biggest proportion of Cups, Lids, and Face Masks collected. Nova Scotia held the highest percentage for Food Packaging, Plastic Bags and Glass and the lowest for Miscellaneous. Prince Edward Island had the highest proportion of Cigarette Butts, and the lowest proportion of Styrofoam and Plastic Bags. Saskatchewan had the least amount of Plastic Bottles and Lids. Manitoba has the lowest percentage of Glass and Plastic Pieces collected.

PROVINCES VERSUS WASTE CATEGORIES


Percentage of waste categories within each participating Canadian Province. Each bar has a total value of $100 \%$ based on the total value of items collected within waste categories of the designated Province. Note, although a school conducted a cleanup in Nunavut, the participants did not provide data.

The top three provinces with the most collected plastic items are: Ontario ( $34.7 \%$, $n=4,376$ ), Saskatchewan (21.5\%, $n=2,703$ ), Alberta ( $11.4 \%, n=1,430$ ). Meanwhile, the provinces with the least amount of plastic items collected were New Brunswick ( $1.1 \%$, $n=136$ ), Nova Scotia ( $2.8 \%, n=357$ ), and British Columbia ( $4.1 \%, n=514$ ).


Count and Percentage of Plastic Items collected within each participating Province. Percentage was calculated from the total number of plastic collected ( $\mathrm{n}=12,598$ ).

All items collected were divided into three categories: Reusable, SingleUse/Disposable, and Inapplicable. The "Inapplicable" label refers to items that could not be labelled either as reusable or disposable, such as organic waste. When considering Cigarette Butts, Plastic Pieces, and Styrofoam Pieces as Single-Use/Disposable items, $80.7 \%$ ( $n=13,727$ ) of the items collected were single-use items. Only 5.6\% ( $n=947$ ) was reusable and $13.8 \%$ ( $n=2,344$ ) was labelled as Inapplicable.


Percentage and Count of Reusable and Disposable items collected by CEAP participants. This calculation was based by considering Cigarette Butts, Plastic Pieces and Unknown Bags as a Single-Use Disposable Item. Percentage was calculated from the total number of items collected ( $n=17,018$ ).


## DISCUSSION

The results show that plastic waste continues to dominate the litter found within different environments. Within the two years of the Circular Economy Ambassador Program (CEAP), Cigarette Butts and Plastic Pieces have been the most prevalent items within the cleanups conducted by students across Canada. This year alone, these two items were responsible for $38 \%$ of the total collected waste, while the total plastic waste summed to a total of $74 \%$ !

A total count of 17,018 items was collected by students in ten different Canadian provinces. To analyze the results, several considerations are required: the total number of participants within each location, the presence or lack of litter, the type of cleanup area coverage, and activities and structures within cleaning areas. Most importantly, it must be noted that the collected items only represent a small fraction of the actual litter quantity that can be present within the cleaned environment.

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## LOCATION DETAILS

Details from the cleanup location types were provided by participants and obtained by viewing a map within an area of $\sim 1 \mathrm{~km}^{2}$.

| TYPE OF LOCATION | COUNT OF SCHOOLS | TOTAL COUNT OF ITEMS COLLECTED | RESTAURANTS COUNT | STORM DRAN COUNTS | STORES ON SITE | SUPERMARKET COUNT | $\begin{aligned} & \text { SCHOOLS/ } \\ & \text { PARKS } \\ & \text { ON SITE } \end{aligned}$ | WASTE/ <br> RECYCLE <br> FACILITIES | OTHER ACTIVITIES |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| School Property | 19 | 9,936 | 17 | 4 | 4 | 5 | Schools Present | Recycling bins were mentioned eight times | » Churches <br> » Dental Office <br> » Public Library <br> » Business Park <br> " Community Centre <br> " Bowling alley <br> » Movie Theatre <br> » Bingo Palace <br> » Fire Hall |
| Park | 4 | 2,569 | 4 | 3 | 1 | 0 | » School <br> Present <br> » Daycare <br> Centre <br> Present | None | »Baseball Diamond <br> » Playground <br> » Biking <br> " Picnics <br> » Tennis Court |
| Neighbourhood | 1 | 2,495 | 2 | 1 | 2 | 1 | None | Recycling bins mentioned once | » Post Office <br> » Church |
| Shoreline | 4 | 2,018 | 1 | Unknown | 0 | 1 | None | Recycling bins mentioned twice | » Hiking <br> » Picnics <br> » Swimming <br> » Camping <br> » Bonfires <br> " Fishing <br> » Parties |

## Advice and Alternatives

## CIGARETTE BUTTS

Cigarette Butts was the most collected waste item in the 2022/2023 CEAP program. About 4.5 trillion cigarettes pollute aquatic and terrestrial environments globally every year (World Health Organization: WHO, 2022). Numerically cigarette butts are the most littered item in the world (Cleanup Australia, 2022). These results match with the Great Canadian Shoreline Cleanup 2021 Dirty Dozen and Ocean Conservancy (Ocean Conservancy, 2023). The Cigarette Litter Reduction report in the City of Vancouver (2023), it estimated that about one million cigarette butts become litter on a daily basis! The cellulose acetate found within cigarettes deems them to be non-biodegradable, taking years for it to break down and decompose (Torres et al., 2019; Enactus Canada, 2017). Although there could be several reasons for the source of cigarette butts in the cleanup locations in the CEAP Program, such as lack of ashtrays, absence of proper recycle bins and garbage bins, and intentional littering, most cigarette butts are still found only a small distance away from an ashtray (TerraCycle, 2021). According to Rath et al. (2012), even though smokers seem to be familiar with the environmental impact of cigarette butt litter, most of them still do not recognize it as litter debris.

Therefore, both appropriate waste disposal and education are still needed to inform smokers of the negative effects of cigarette litter, and benefit from the help of creative and sustainable business solutions. The Enactus team from the University of Ottawa has started to solve the lack of cigarette disposal bins (Enactus Canada, 2017). The team has
developed a practical and fireproof cigarette disposal unit called CigBins, with affordable installation and pick-up charges. Enactus provides employment to individuals with mental illnesses or disabilities to manage the bins, transforming cigarette butt waste into industrial materials to be reinserted into the economy. In addition, TerraCycle (2023) has further facilitated the recycling of cigarette waste in their "UNSMOKE Cigarette Recycling Program". Smokers can now download a free shipping label to send their cigarette waste to be recycled by TerraCycle, which

> In Vancouver alone, it is estimated that about one million cigarette butts become litter on a daily basis!

uses them as a resource to fabricate plastic pellets, ashtrays, and benches. Although cigarette waste recycling programs exist, they are not well-known by the public, therefore, these organizations should enhance their outreach efforts by partnering with

NGOs, municipal/provincial/federal governments, and other organizations to better diffuse their services.

Another potential solution for this cigarette butt pollution issue could be to take the same approach that was established in Spain at the beginning of 2023. In 2019, an agreement to ban single-use plastics by 2021 was signed by the European Union. In January of 2023, Spain developed regulations in which tobacco manufacturers will now have to pay for the cost of cigarette waste cleanups (Boletín Oficial del Estado, 2022). Since Canada produces about 8,000 tonnes of cigarette butts litter annually, this could be a step towards reducing the pollution, and potentially decreasing the cost of environmental cleanups (TerraCycle, 2023). Furthermore, Canada could continue to ban smoking in public areas such as beaches and parks, to reduce the amount of litter found within these areas. Despite the fact that programs exist and the government can develop new regulations, awareness campaigns are still required to inform individuals of the harmful effects of cigarette butt litter within our environments to establish a behavioural change within society.

## PLASTIC

It is estimated that about 230 million metric tonnes of plastic waste will be produced annually worldwide by 2025 (Lebreton 2019), which is equivalent to the weight of over 1 million blue whales, the heaviest animal on earth. Out of the total number of waste items collected ( $\mathrm{n}=17,018$ ) by CEAP participants, $74 \%(n=12,598)$ were entirely or partially composed of plastic. Additionally, out of the Top Ten Items collected, eight are entirely

## The amount of plastic present in all the litter collected cannot be ignored and must be managed.

composed of plastic and plastic items were found in all the locations cleaned. The most commonly found plastic items were Plastic Pieces of different sizes ( $18.6 \%, n=3,163$ ) and Single-Use Plastic Items ( $27.7 \%, \mathrm{n}=4,725$ ) which were mostly composed of single-use Food Packaging. However, Plastic Bottles, Cold Drinks Cups, and Plastic Bottle Caps were highly present as well. The amount of plastic present in all the litter collected cannot be ignored and must be managed.

Certain plastics are easily noticed and recovered from environments due to their colour and size. Plastic Bottles, Cold Drinks Cups and Bottle Caps, were the most collected plastic items apart from Plastic Pieces and Food Packaging. These collected plastic items all relate to the transportation of liquids. Therefore, governments should adopt new regulations for manufacturers to choose a more effective product design that prioritizes the
reduction of plastic by making products reusable, or more circular for liquid storage, transportation and distribution. Potentially, if companies followed the example of the European Union where containers should be produced with "caps and lids" attached, while producing caps with a single material type allowing it to be recycled with the attached container, it could reduce cap pollution (European Union, 2019). Additionally, the replacement of plastic caps with sustainable alternatives could further reduce this type of pollution. Furthermore, the propagation of "deposit-refund" programs within local supermarkets, shops, and commercial centers, could reduce plastic bottle littering (ECCC 2020). As for the Cold Drink Cups, businesses should opt for reusable/returnable foodware like the Sharewares and Friendlier programs that have partnered with businesses such as Tim Hortons and Skip the Dishes, to reduce single-use plastic waste, while creating awareness about a circular economy way of life. Furthermore, an example that could be followed within the supermarket industry is the Prefill Model by City to Sea in the United Kingdom. The "Ready to prefill?" report by Morley et al. (2023) demonstrates how refillable, reusable and returnable product packaging benefits different industrial brands/retailers, consumers, and the environment.

## SINGLE-USE ITEMS AND FOOD PACKAGING

The participants of the CEAP program collected a total of 6,474 Single-Use Items in which over half of the items ( $n=4,725$ ) were Single-Use Plastics mostly composed of Food Packaging ( $n=3,318$ ). Food Packaging is composed of
hard-to-recycle materials (Williams and RangelBuitrago, 2019), which possibly leads them to be a source of microplastics. The United Nations Environment Program (UNEP) has established a global environmental pollution crisis due to the single-use plastic waste (UNEP,2014). Single-use plastics are a prevalent component contributing to plastic waste within Canada and internationally (ECCC, 2020). According to the Great Canadian Shoreline Cleanup, and Government of Canada, $17 \%$ of debris collected within shoreline cleanup efforts was composed of single-use plastics (ECCC, 2020). Since areas with a higher presence of human activities and industrial actions tend to have higher plastic pollution (Driedger et al., 2015), this could explain the presence of single-use plastics within all cleanup locations and provinces, along with the total number of single-use disposable items ( $80.7 \%, n=13,727$ ). Therefore, governments should establish regulations, policies, and programs to aid in the transition of replacing single-use items with reusable alternatives.

Governments play an important role in introducing a circular economy into society and should continue to introduce policies that require a systemic change from businesses and manufacturers, allowing consumers to make balanced decisions on sustainable and plastic-free shopping, since this is not the current reality. Individuals also have the power to take steps toward that change. Consumers can choose to purchase and use reusable, sustainable, or biodegradable alternatives to single-use items. Alternatively, they can opt for shopping from zero-waste stores such as the NU
grocery, where customers bring their containers to purchase local and package-free items. Although these small daily choices can have a big impact in reducing the accumulation of plastic waste in both terrestrial and aquatic environments, these choices are not yet convenient, affordable, and accessible to the public, forcing them to opt for the more affordable and nonsustainable options.

## PAPER

Similar to plastics, paper has become an essential material within our economy due to its numerous uses. However, on average $10 \%$ of residential and $14 \%$ of commercial paper waste composition is destined for landfills or incineration within Canada (ECCC, 2020). Although paper is recyclable and degradable, it is one of the top three degradable materials sent to landfills (ECCC, 2020). Furthermore, Canada is the fourth biggest paper producer globally, with over 30 million tonnes of paper yearly but only $25 \%$ is recycled (NRC 2003;Pulp and Paper Products Council, 2023). Since it takes several trees, hundreds of litres of water, and pollution associated with paper production and transportation, enhancing paper recycling is essential to reduce deforestation, diminish water contamination and divert it from our landfills (Beckline, 2016). As industries transition out of single-use plastic items, there has been an increase in demand for paper alternatives. This could be the reason Paper was the most Commonly Found Item (10.4\%, n = 1,775) in the CEAP program and most prevalent type of waste in School Properties and Parks. These two locations have the highest number of restaurants and/or human gatherings where food, tableware and other items may be stored or composed of paper, to be shared among a group of people. Due to technological advances,
there are several alternatives to paper materials. Stationary paper items can easily be digitized with a computer and/or tablets such as the Remarkable Notebook Paper Tablet (Williams and Rangel-Buitrago, 2019; ReMarkable). While in the food industry, reusable tableware and cloth napkins could be effective alternatives. The importance of reducing waste could still be a notorious topic for many people, and education on this matter is a much-needed requirement that has been proven to encourage individuals to adopt sustainable behaviours (Torres et al., 2019).

## ALUMINUM/TIN FOIL AND CANS

Waste collected by the CEAP participants in the Miscellaneous Items category were mainly composed of Aluminum/Tin Foil ( $n=224$ ), while several Cans were also collected ( $n=486$ ). These types of metals are commonly used in the food industry to store canned goods and carbonated drinks, both of which are easy to carry and purchase within public areas such as Shorelines, whose waste contained the highest percentage of Cans and Miscellaneous Items categories. In addition, when compared to the percentages of these items within other provinces, due to the low number of participants and waste items collected, New Brunswick's waste contained the highest percentage of Cans, while Newfoundland and Labrador had the highest percentage of Miscellaneous Items (Aluminum/Tinfoil). Canada is the fourth aluminum manufacturer in the world and yet, according to Environment and Climate Change Canada (2020), metals such as aluminum/tin foil and cans are responsible for about $3.2 \%$ of all Canadian municipal solid waste (NRC 2023;ECCC, 2020). Even though aluminum is interminably recyclable, it is still found in our landfills and environments as litter. This is possibly
due to the lack of public awareness of how to properly recycle this type of metal after it has come in contact with contaminants, such as food. In addition, as most canned foods and beverages contain interior plastic lining, there is an unaccounted for percentage of plastic litter associated with these items that degrades in the environment (Lorber et al., 2015). Therefore, further education for both industries and individuals should be provided to eliminate this recyclable item from the litter found in different locations.


Although several of the items commonly collected by CEAP participants through cleanups are recyclable, or reusable, they were still found as litter. Further studies are required to clearly identify if there is a lack of knowledge, waste disposal resources, available/ affordable reusable options, or if it is a behavioural choice that is causing these items to enter our environment. Based on the results of these studies, both governments and individuals can grow to adapt to the recommended solutions.


## RECOMMENDATIONS ON REDUCING WASTE

SINGLE-USE ITEMS RECOMMENDATIONS
The Canadian Single-Use Plastics Prohibition Regulations (LSB, 2023), prohibited the production, importation and distribution of six single-use plastic items: plastic cutlery, straws, shopping bags, stir sticks, foodservice ware, and ring carriers (ECCC, 2023). However, this regulation does not target items such as Food Packaging, Plastic Bottles, Cold Drink Cups, and Plastic Bottle Caps that were mostly collected in the CEAP program and the Great Canadian Shoreline Cleanup (Vandermeer, 2022). Therefore, governments need to adapt the regulation to further address the main single-use plastic items littering Canadian provinces and territories. Therefore, as bans are developed they must be standardized across all provinces and territories and continue to promote additional taxes for single-use items, but also shift the focus to transitioning single-use plastic items to reusable
alternatives. The extended producer responsibility approach could be ameliorated by increasing the number of products covered (Baxter et al. 2022). Additionally, it must bear not just the cost of waste management and litter cleanups, but also the social and environmental costs associated with single-use plastic pollution, along with the costs of awareness programs to reduce the littering of their products (Baxter et al., 2022; Khan 2015; EU 2019).

## EDUCATION RECOMMENDATIONS

The Canada-wide Strategy on Zero Plastic Waste mentions that consumer and public education are activities that would support the Strategy, however, it does not include a detailed plan of what actionable steps will be taken to provide this education to the interested parties (CCME, 2018). According to Kerscher (2019) education and awareness are fundamental to decreasing
and impeding the accumulation of litter. Canadian governments can focus on developing anti-littering campaigns while educational systems must focus on adding formal courses (Baxter et al. 2022) that introduce the plastic pollution implications to the environment, to create awareness and encourage behavioural change by future generations at the individual level. The introduction of litter environmental impacts, waste reduction, reuse of materials and active participation in a circular economy, should be immersed in different educational course subjects, including activities from inside and outside the classroom while also incorporating informal educational programs, such as the CEAP program and museum and recycling facilities visits, into the school syllabus (Pettipas et al., 2016). Through theoretical and hands-on experience, youth would then be able to
comprehend the full extent of the issues related to plastic pollution, and what approaches can reduce and prevent it through small daily actions, leading to behavioural changes towards a circular economy. In addition, if Canada expands their extended producer responsibility, the costs related to these educational and awareness efforts would be covered by the producers themselves reducing the governmental expenses.

## LIMITATIONS

Environmental cleanups can have several limitations. In the case of the CEAP program, the participants collecting waste were between the ages of 4-18. If the participants saw a type of debris which they did not feel safe collecting, they were advised to not touch it. The debris collected was of visible size and location, hence there is an underestimation of fragmented litter and debris that may have been under sediment. In addition, participants were not able to collect data on plastic types and colours, along with the brand names of items, which could further aid in the source determination of waste. Furthermore, the estimated waste weights and measurement of areas cleaned by participants were not accurate due to the lack of portable scales and recorded area sizing, and several schools did not provide an estimated weight or distance with the data. These components will be added to the recording datasheets for a better analysis of the data collected through the CEAP program in the upcoming years.


## CONCLUSION

## Due to its abundance, plastic pollution negatively impacts economies, wildlife, and human health.

Identification of items collected through the CEAP program was fundamental to hypothesizing sources of each item and considering more sustainable alternatives to reduce waste. Additionally, through the program, students were inspired to advocate for change within their local community by seeking municipal council and requesting single-use plastics bans. Therefore, as $74 \%$ of the total waste collected in the CEAP program was entirely or partially composed of plastic, along with the similarity of the data collected through the two years of the CEAP program, it evidently illustrates that Cigarette Butts, Plastic Pieces, Paper, Food Packaging and other plastic items are highly present as litter in environments across Canada. This information can help inform stakeholders, policymakers, municipal councils, and governmental parties on which items their policies and regulations should target to reduce the amount of plastic litter.

Based on the discussed findings of the CEAP program, it is recommended that Canadian governments use a multifaceted approach to reduce and mitigate plastic waste:

- Enhance public education by adding formal courses on this topic to curriculums;
- Establish product design that focuses on circularity of materials and reusability;
- Regulate the amount and type of packaging materials;
- Add more single-use plastic items to the Single-use Plastics Prohibition;
- Invest in reusable and circular infrastructure in Canadian industries;
- Diffuse programs that transform retailers into waste-free stores;
- Include clear, actionable steps in mitigation and preventions plans;
- Increase litter monitoring and consequences for those who are caught littering;
- Install effective waste disposal bins in public areas combined with stronger waste management, and Provide funds to non-profit organizations and charities that enhance awareness.

With one dump truck of plastic entering the oceans every minute, it is impossible to keep up with removing it from our environment by cleaning it up (Fela, 2018).

Since cleanups are a short-term remedy to this issue, long-term solutions must be developed by the combined effort of federal governments, provincial and territorial governments, municipalities, policymakers, industrial stakeholders, individuals, educational systems, non-profit organizations, and charities. Together, an efficient plan can be developed and implemented on a global scale, producing multinational results.

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BUILDING A CIRCULAR ECONOMY 2023 CEAP Report

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APPENDIX

TABLE 11: TOTAL AMOUNTS AND PERCENTAGES OF ITEMS FOUND WITHIN EACH CATEGORY.

| CATEGORY | TOTAL PERCENTAGE | TOTAL COUNT |
| :---: | :---: | :---: |
| Cigarette Butts | 19.50\% | 3,318 |
| Plastic Pieces | 18.59\% | 3,163 |
| Commonly Found Items | 18.49\% | 3,146 |
| Food Packaging | 9.77\% | 1,663 |
| Miscellaneous | 6.79\% | 1,156 |
| Plastic Bags | 4.77\% | 812 |
| Cups | 3.97\% | 675 |
| Styrofoam Pieces | $3.21 \%$ | 547 |
| Bottle | 3.07\% | 522 |
| Lids | 2.87\% | 489 |
| Glass | 2.87\% | 488 |
| Cans | 2.86\% | 486 |
| Face Masks | 2.68\% | 456 |
| Take-Out Containers | 0.53\% | 90 |
| Fishing Gear | 0.04\% | 7 |
| TOTAL | 100.00\% | 17,018 |



TABLE 12: AMOUNT AND PERCENTAGE OF ALL PLASTIC ITEMS COLLECTED.

| ITEM | RECYCLABLE OR GARBAGE | TOTAL PERCENTAGE | TOTAL COUNT |
| :---: | :---: | :---: | :---: |
| Cigarette Butts | Recyclable | 26.34\% | 3,318 |
| Plastic Pieces Small (0-10 cm) | Recyclable | 14.26\% | 1,797 |
| Food Packaging | Recyclable | 13.20\% | 1,663 |
| Plastic Pieces Medium ( $10-30 \mathrm{~cm}$ ) | Recyclable | 6.88\% | 867 |
| Plastic Bottle | Recyclable | 4.14\% | 522 |
| Plastic Pieces Large (>30 cm) | Recyclable | 3.64\% | 459 |
| Cold Drink Cup | Recyclable | 3.34\% | 421 |
| Plastic Bottle Caps | Recyclable | 3.06\% | 385 |
| Disposable Face Mask | Recyclable | 2.13\% | 268 |
| Cold Drink Lids | Recyclable | 2.10\% | 264 |
| Ziplock Bags | Recyclable | 1.94\% | 244 |
| Styrofoam Piece Small ( $0-10 \mathrm{~cm}$ ) | Garbage | 1.86\% | 234 |
| Unknown Bag | Garbage | 1.79\% | 225 |
| Hot Drink Lids | Recyclable | 1.79\% | 225 |
| Rope | Recyclable | 1.65\% | 208 |
| Wipes | Garbage | 1.58\% | 199 |
| Styrofoam Piece Large (>30 cm) | Garbage | 1.57\% | 198 |
| Shopping Bags | Recyclable | 1.50\% | 189 |
| Garbage Bags | Recyclable | 1.22\% | 154 |
| Plastic Cutlery | Recyclable | 1.03\% | 130 |
| Styrofoam Piece Medium (10-30 cm) | Garbage | 0.90\% | 114 |
| Tape | Garbage | 0.73\% | 92 |
| Take-Out Containers | Garbage | 0.71\% | 90 |
| Hair Elastics | Recyclable | 0.48\% | 61 |
| Vape | Recyclable | 0.40\% | 50 |
| Plastic Pieces All Sizes | Recyclable | 0.32\% | 40 |
| Feminine Hygiene Products | Garbage | 0.25\% | 31 |
| Bread Tags | Recyclable | 0.23\% | 29 |
| Dog Poop Bag | Garbage | 0.20\% | 25 |
| Lollipop Stick | Garbage | 0.15\% | 19 |
| 6-Pack Rings | Recyclable | 0.08\% | 10 |
| Needle | Garbage | 0.07\% | 9 |
| Net-Rope | Recyclable | 0.06\% | 7 |
| Ziptie | Recyclable | 0.05\% | 6 |
| Toy | Recyclable | 0.04\% | 5 |
| Pen | Recyclable | 0.04\% | 5 |

TABLE 12: AMOUNT AND PERCENTAGE OF ALL PLASTIC ITEMS COLLECTED. (CONT'D)

| ITEM | RECYCLABLE OR GARBAGE | TOTAL PERCENTAGE | TOTAL COUNT |
| :---: | :---: | :---: | :---: |
| Balloon | Recyclable | 0.04\% | 5 |
| Lighter | Recyclable | 0.02\% | 3 |
| Band-Aid | Garbage | 0.02\% | 3 |
| Viny String | Recyclable | 0.02\% | 2 |
| Vape Pod | Recyclable | 0.02\% | 2 |
| Stickers | Garbage | 0.02\% | 2 |
| Shoe | Recyclable | 0.02\% | 2 |
| Marker | Recyclable | 0.02\% | 2 |
| Lip Balm | Recyclable | 0.02\% | 2 |
| Flag | Recyclable | 0.02\% | 2 |
| Calculator | Recyclable | 0.02\% | 2 |
| Tennis Ball | Recyclable | 0.01\% | 1 |
| Styrofoam All Sizes | Garbage | 0.01\% | 1 |
| Shoe Sole | Recyclable | 0.01\% | 1 |
| Hand Sanitizer | Recyclable | 0.01\% | 1 |
| Floss | Garbage | 0.01\% | 1 |
| Diaper | Garbage | 0.01\% | 1 |
| Condom | Garbage | 0.01\% | 1 |
| Ball | Recyclable | 0.01\% | 1 |
| Grand Total |  | 100.00\% | 12,598 |
| Garbage Total |  | 9.88\% | 1,245 |
| Recyclable Total |  | 90.12\% | 11,353 |

TABLE 13: TOTAL AMOUNTS AND PERCENTAGE OF ALL ITEMS COLLECTED.

| ITEM | TOTAL PERCENTAGE | TOTAL COUNT |
| :---: | :---: | :---: |
| Cigarette Butts | 19.50\% | 3,318 |
| Plastic Pieces Small (0-10 cm) | 10.56\% | 1,797 |
| Paper | 10.43\% | 1,775 |
| Food Packaging | 9.77\% | 1,663 |
| Plastic Pieces Medium ( $10-30 \mathrm{~cm}$ ) | $5.09 \%$ | 867 |
| Plastic Bottle | 3.07\% | 522 |
| Can | 2.70\% | 460 |
| Plastic Pieces Large (>30 cm) | 2.70\% | 459 |
| Cold Drink Cup | 2.47\% | 421 |
| Bottle Caps | 2.26\% | 385 |
| Glass Pieces/Fragments | 2.01\% | 342 |
| Straws | 1.81\% | 308 |
| Disposable Face Mask | 1.57\% | 268 |
| Cold Drink Lids | 1.55\% | 264 |
| Fishing Gear | 0.04\% | 488 |
| Hot Drink Cup | 1.49\% | 254 |
| Ziplock Bags | 1.43\% | 244 |
| Styrofoam Piece Small ( $0-10 \mathrm{~cm}$ ) | 1.38\% | 234 |
| Unknown Bag | 1.32\% | 225 |
| Hot Drink Lids | 1.32\% | 225 |
| Aluminum/Tin Foil | 1.32\% | 224 |
| Rope | 1.22\% | 208 |
| Wipes | 1.17\% | 199 |
| Styrofoam Piece Large (>30 cm) | 1.16\% | 198 |
| Shopping Bags | 1.11\% | 189 |
| Reusable Face Mask | 1.10\% | 188 |
| Rubber Pieces | 0.93\% | 159 |
| Garbage Bags | 0.90\% | 154 |
| Rubber Bands | 0.88\% | 150 |
| Glass Bottle | 0.86\% | 146 |
| Plastic Cutlery | 0.76\% | 130 |
| Styrofoam Piece Medium ( $10-30 \mathrm{~cm}$ ) | 0.67\% | 114 |


| ITEM | TOTAL PERCENTAGE | TOTAL COUNT |
| :---: | :---: | :---: |
| Cardboard | 0.64\% | 109 |
| Tape | 0.54\% | 92 |
| Take-Out Containers | 0.53\% | 90 |
| Hair Elastics | 0.36\% | 61 |
| Can Tab | 0.35\% | 59 |
| Vape | 0.29\% | 50 |
| Plastic Pieces All Sizes | 0.24\% | 40 |
| Pencil | 0.22\% | 37 |
| Steel//Aluminum Bottle Caps | 0.21\% | 35 |
| Feminine Hygiene Products | 0.18\% | 31 |
| Bread Tags | 0.17\% | 29 |
| Clothes | 0.15\% | 26 |
| Dog Poop Bag | 0.15\% | 25 |
| Wood | 0.13\% | 22 |
| Metal | 0.12\% | 21 |
| Lollipop Stick | 0.11\% | 19 |
| Fabric | 0.11\% | 18 |
| Cloth | 0.06\% | 11 |
| Cigarette Packs | 0.06\% | 10 |
| 6-Pack Rings | 0.06\% | 10 |
| Tissue/Kleenex | 0.05\% | 9 |
| Needle | 0.05\% | 9 |
| Net-Rope | 0.04\% | 7 |
| Ziptie | 0.04\% | 6 |
| Organic Waste | 0.04\% | 6 |
| Jewerry | 0.04\% | 6 |
| Cigar | 0.04\% | 6 |
| Toy | 0.03\% | 5 |
| Pen | 0.03\% | 5 |
| Balloon | 0.03\% | 5 |
| Screws | 0.02\% | 4 |
| Screws | 0.02\% | 4 |

TABLE 13: TOTAL AMOUNTS AND PERCENTAGE OF ALL ITEMS COLLECTED. (CONT'D)

| ITEM | TOTAL <br> PERCENTAGE | TOTAL |
| :---: | :---: | :---: |
| COUNT |  |  |


| ITEM | TOTAL <br> PERCENTAGE | TOTAL <br> COUNT |
| :---: | :---: | :---: |
| Glasses | $0.01 \%$ | 1 |
| Floss | $0.01 \%$ | 1 |
| Diaper | $0.01 \%$ | 1 |
| Condom | $0.01 \%$ | 1 |
| Chopsticks | $0.01 \%$ | 1 |
| Brick | $0.01 \%$ | 1 |
| Blanket | $0.01 \%$ | 1 |
| Bike Seat | $0.01 \%$ | 1 |
| Banana Peel | $0.01 \%$ | 1 |
| Ball | $0.01 \%$ | 1 |
| Grand Total | $\mathbf{1 0 0 . 0 0 \%}$ | $\mathbf{1 7 , 0 1 8}$ |



TABLE 14: SINGLE-USE/DISPOSABLE, REUSABLE, AND INAPPLICABLE CLASSIFICATION OF ALL ITEMS COLLECTED ALONG WITH QUANTITIES AND PERCENTAGE.

| SINGLE-USE PLASTIC OR OTHER | TYPE | ITEM | TOTAL COUNT | \% |
| :---: | :---: | :---: | :---: | :---: |
| Other | Inapplicable | Banana Peel | 1 | 0.01\% |
| Other | Inapplicable | Chopsticks | 1 | 0.01\% |
| Other | Inapplicable | Cloth | 11 | 0.06\% |
| Other | Inapplicable | Fabric | 18 | 0.11\% |
| Other | Inapplicable | Glass Pieces/Fragments | 342 | 2.01\% |
| Other | Inapplicable | Metal | 21 | 0.12\% |
| Other | Inapplicable | Metal Wire | 1 | 0.01\% |
| Other | Inapplicable | Organic Waste | 6 | 0.04\% |
| Other | Inapplicable | Paper | 1,775 | 10.43\% |
| Other | Inapplicable | Pipe | 4 | 0.02\% |
| Other | Inapplicable | Rubber Pieces | 159 | 0.93\% |
| Other | Inapplicable | Shingle | 1 | 0.01\% |
| Other | Inapplicable | Shoe Sole | 1 | 0.01\% |
| Other | Inapplicable | Spring | 1 | 0.01\% |
| Other | Inapplicable | Tube | 2 | 0.01\% |
| Other | Reusable | Ball | 1 | 0.01\% |
| Other | Reusable | Bike Seat | 1 | 0.01\% |
| Other | Reusable | Blanket | 1 | 0.01\% |
| Other | Reusable | Brick | 1 | 0.01\% |
| Other | Reusable | Calculator | 2 | 0.01\% |
| Other | Reusable | Car Part | 4 | 0.02\% |
| Other | Reusable | Clothes | 26 | 0.15\% |
| Other | Reusable | Coat | 2 | 0.01\% |
| Other | Reusable | Flag | 2 | 0.01\% |
| Other | Reusable | Glass Bottle | 146 | 0.86\% |
| Other | Reusable | Glasses | 1 | 0.01\% |
| Other | Reusable | Glove | 3 | 0.02\% |
| Other | Reusable | Golf Ball | 1 | 0.01\% |
| Other | Reusable | Hair Elastics | 61 | 0.36\% |
| Other | Reusable | Jewelry | 6 | 0.04\% |
| Other | Reusable | Lighter | 3 | 0.02\% |
| Other | Reusable | Net-Rope | 7 | 0.04\% |
| Other | Reusable | Pen | 5 | 0.03\% |
| Other | Reusable | Pencil | 37 | 0.22\% |
| Other | Reusable | Pokemon Card | 1 | 0.01\% |
| Other | Reusable | Propane Tank | 1 | 0.01\% |
| Other | Reusable | Reusable Face Mask | 188 | 1.10\% |

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TABLE 14: SINGLE-USE/DISPOSABLE, REUSABLE, AND INAPPLICABLE CLASSIFICATION OF ALL ITEMS COLLECTED ALONG WITH QUANTITIES AND PERCENTAGE. (CONT'D)

| SINGLE-USE PLASTIC OR OTHER | TYPE | ITEM | TOTAL COUNT | \% |
| :---: | :---: | :---: | :---: | :---: |
| Other | Reusable | Rope | 208 | 1.22\% |
| Other | Reusable | Rubber Bands | 150 | 0.88\% |
| Other | Reusable | Rug | 1 | 0.01\% |
| Other | Reusable | Saw | 1 | 0.01\% |
| Other | Reusable | Screws | 4 | 0.02\% |
| Other | Reusable | Shoe | 2 | 0.01\% |
| Other | Reusable | Sled | 1 | 0.01\% |
| Other | Reusable | Sock | 1 | 0.01\% |
| Other | Reusable | Tennis Ball | 1 | 0.01\% |
| Other | Reusable | Tire | 1 | 0.01\% |
| Other | Reusable | Toy | 5 | 0.03\% |
| Other | Reusable | Vape | 50 | 0.29\% |
| Other | Reusable | Wood | 22 | 0.13\% |
| Other | Single-Use | Unknown Bag | 225 | 1.32\% |
| Single-Use Plastic | Single-Use | 6-Pack Rings | 10 | 0.06\% |
| Other | Single-Use | Aluminum/Tin Foil | 224 | 1.32\% |
| Single-Use Plastic | Single-Use | Balloon | 5 | 0.03\% |
| Single-Use Plastic | Single-Use | Band-Aid | 3 | 0.02\% |
| Other | Single-Use | Battery | 2 | 0.01\% |
| Single-Use Plastic | Single-Use | Plastic Bottle Caps | 385 | 2.26\% |
| Single-Use Plastic | Single-Use | Bread Tags | 29 | 0.17\% |
| Other | Single-Use | Can | 460 | 2.70\% |
| Other | Single-Use | Can Tab | 59 | 0.35\% |
| Other | Single-Use | Cardboard | 109 | 0.64\% |
| Other | Single-Use | Cigar | 6 | 0.04\% |
| Single-Use Plastic | Single-Use | Cigarette Butts | 3,318 | 19.50\% |
| Other | Single-Use | Cigarette Packs | 10 | 0.06\% |
| Single-Use Plastic | Single-Use | Cold Drink Cup | 421 | 2.47\% |
| Single-Use Plastic | Single-Use | Cold Drink Lids | 264 | 1.55\% |
| Single-Use Plastic | Single-Use | Condom | 1 | 0.01\% |
| Single-Use Plastic | Single-Use | Diaper | 1 | 0.01\% |
| Single-Use Plastic | Single-Use | Disposable Face Mask | 268 | 1.57\% |
| Single-Use Plastic | Single-Use | Dog Poop Bag | 25 | 0.15\% |
| Single-Use Plastic | Single-Use | Feminine Hygiene Products | 31 | 0.18\% |
| Single-Use Plastic | Single-Use | Floss | 1 | 0.01\% |
| Other | Single-Use | Food Packaging | 1,663 | 9.77\% |
| Single-Use Plastic | Single-Use | Garbage Bags | 154 | 0.90\% |

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TABLE 14: SINGLE-USE/DISPOSABLE, REUSABLE, AND INAPPLICABLE CLASSIFICATION OF ALL ITEMS COLLECTED ALONG WITH QUANTITIES AND PERCENTAGE. (CONT'D)

| SINGLE-USE PLASTIC OR OTHER | TYPE | ITEM | TOTAL COUNT | \% |
| :---: | :---: | :---: | :---: | :---: |
| Single-Use Plastic | Single-Use | Hand Sanitizer | 1 | 0.01\% |
| Other | Single-Use | Hot Drink Cup | 254 | 1.49\% |
| Single-Use Plastic | Single-Use | Hot Drink Lids | 225 | 1.32\% |
| Single-Use Plastic | Single-Use | Lip Balm | 2 | 0.01\% |
| Single-Use Plastic | Single-Use | Lollipop Stick | 19 | 0.11\% |
| Other | Single-Use | Marker | 2 | 0.01\% |
| Single-Use Plastic | Single-Use | Needle | 9 | 0.05\% |
| Single-Use Plastic | Single-Use | Plastic Bottle | 522 | 3.07\% |
| Single-Use Plastic | Single-Use | Plastic Cutlery | 130 | 0.76\% |
| Other | Single-Use | Plastic Pieces All Sizes | 40 | 0.24\% |
| Other | Single-Use | Plastic Pieces Large (>30 cm) | 459 | 2.70\% |
| Other | Single-Use | Plastic Pieces Medium ( $10-30 \mathrm{~cm}$ ) | 867 | 5.09\% |
| Other | Single-Use | Plastic Pieces Small ( $0-10 \mathrm{~cm}$ ) | 1,797 | 10.56\% |
| Other | Single-Use | Popsicle Stick | 1 | 0.01\% |
| Single-Use Plastic | Single-Use | Shopping Bags | 189 | 1.11\% |
| Other | Single-Use | Steel/Aluminum Bottle Caps | 35 | 0.21\% |
| Single-Use Plastic | Single-Use | Stickers | 2 | 0.01\% |
| Other | Singl-Use | Straws | 308 | 1.81\% |
| Single-Use Plastic | Single-Use | Styrofoam All Sizes | 1 | 0.01\% |
| Single-Use Plastic | Single-Use | Styrofoam Piece Large (>30 cm) | 198 | 1.16\% |
| Single-Use Plastic | Single-Use | Styrofoam Piece Medium ( $10-30 \mathrm{~cm}$ ) | 114 | 0.67\% |
| Singl-Use Plastic | Single-Use | Styrofoam Piece Small ( $0-10 \mathrm{~cm}$ ) | 234 | 1.38\% |
| Single-Use Plastic | Single-Use | Take-Out Containers | 90 | 0.53\% |
| Single-Use Plastic | Single-Use | Tape | 92 | 0.54\% |
| Other | Single-Use | Tissue/Kleenex | 9 | 0.05\% |
| Single-Use Plastic | Single-Use | Vape Pod | 2 | 0.01\% |
| Other | Single-Use | Viny I String | 2 | 0.01\% |
| Other | Single-Use | Wipes | 199 | 1.17\% |
| Single-Use Plastic | Single-Use | Ziplock Bags | 244 | 1.43\% |
| Single-Use Plastic | Single-Use | Ziptie | 6 | 0.04\% |
|  |  | Single-use Total | 13,727 | 80.6\% |
|  |  | Reusable Total | 947 | 5.56\% |
|  |  | Inapplicable Total | 2,344 | 13.7\% |
|  |  | GRAND TOTAL | 17,018 |  |

TABLE 15: AMOUNT OF ITEMS WITHIN EACH WASTE CATEGORY ACROSS THE DIFFERENT LOCATION TYPES.

|  | CATEGORY |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| $\begin{aligned} & \text { LOCATION } \\ & \text { TYPE } \end{aligned}$ | PLASTIC BOTTLE | CANS | CIGARETTE BUTTS | COMMONLY FOUND ITEMS | CUPS | FACEMASKS | FISHING GEAR | FOOD PACKAGING | GLASS | LIDS | MISCELLANEOUS | PLASTIC BAGS | PLASTIC PIECES | STYROFOAM PIECES | TAKE-OUT CONTAINERS | GRAND TOTAL |
| Neighbourhood | 45 | 70 | 766 | 426 | 33 | 24 |  | 183 | 64 | 18 | 185 | 54 | 546 | 76 | 5 | 2,495 |
| Park | 74 | 42 | 713 | 499 | 93 | 51 |  | 379 | 44 | 46 | 118 | 141 | 236 | 123 | 10 | 2,569 |
| School Property | 344 | 284 | 1,236 | 2,030 | 530 | 375 | 4 | 1,084 | 342 | 410 | 669 | 572 | 1,677 | 306 | 73 | 9,936 |
| Shoreline | 59 | 90 | 603 | 192 | 19 | 6 | 3 | 17 | 38 | 15 | 183 | 45 | 704 | 42 | 2 | 2,018 |
| Grand Total | 522 | 486 | 3,318 | 3,147 | 675 | 456 | 7 | 1,663 | 488 | 489 | 1,155 | 812 | 3,163 | 547 | 90 | 17,018 |

TABLE 16: AMOUNT OF ITEMS WITHIN EACH WASTE CATEGORY ACROSS THE DIFFERENT CANADIAN PROVINCES.

| SUM OF QUANTITY | CATEGORY |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| LOCATION TYPE | PLASTIC BOTTLE | CANS | CIGARETTE BUTTS | COMMONLY FOUND ITEMS | cUPS | FACE MASKS | FISHING GEAR | FOOD PACKAGING | GLASS | LIDS | MISCELLANEOUS | PLASTIC BAGS BAGS | PLASTIC PIECES | STYROFOAM PIECES | TAKE-OUT CONTAINERS | GRAND TOTAL |
| Alberta | 55 | 37 | 45 | 488 | 226 | 230 |  | 102 | 48 | 215 | 273 | 110 | 342 | 182 | 33 | 2,386 |
| British Columbia | 19 | 27 | 106 | 278 | 21 | 30 |  | 51 | 12 | 20 | 40 | 38 | 69 | 64 | 5 | 780 |
| Manitoba | 77 | 50 | 360 | 365 | 36 | 36 | 4 | 232 | 17 | 32 | 72 | 104 | 47 | 48 | 20 | 1,500 |
| New Brunswick | 12 | 63 | 3 | 96 | 12 | 3 |  | 14 | 8 | 10 | 24 | 15 | 12 | 16 | 2 | 290 |
| Newfoundland | 47 | 31 | 1 | 42 | 10 | 10 |  | 5 | 25 | 9 | 157 | 10 | 268 | 24 | 1 | 640 |
| Nova Scotia | 17 | 10 | 1 | 76 | 9 | 12 | 3 | 151 | 71 | 8 | 7 | 63 | 70 | 10 | 2 | 510 |
| Ontario | 144 | 101 | 1,149 | 803 | 197 | 66 |  | 613 | 113 | 114 | 278 | 300 | 1,302 | 93 | 12 | 5,285 |
| Prince Edward Island | 46 | 22 | 485 | 104 | 76 | 14 |  | 64 | 105 | 42 | 37 | 18 | 123 | 7 | 2 | 1,145 |
| Quebec | 37 | 53 | 225 | 149 | 17 | 13 |  | 78 | 11 | 17 | 25 | 43 | 98 | 13 | 5 | 784 |
| Saskatchewan | 68 | 92 | 943 | 746 | 71 | 42 |  | 353 | 78 | 22 | 242 | 111 | 832 | 90 | 8 | 3,698 |
| Grand Total | 522 | 486 | 3,318 | 3,147 | 675 | 456 | 7 | 1,663 | 488 | 489 | 1,155 | 812 | 3,163 | 547 | 90 | 17,018 |

TABLE 17: PERCENTAGE AND AMOUNTS OF ALL THE MISCELLANEOUS ITEMS COLLECTED.

| ITEM | TOTAL PERCENTAGE | TOTAL COUNT |
| :---: | :---: | :---: |
| Aluminum/Tin Foil | 19.38\% | 224 |
| Rope | 17.99\% | 208 |
| Rubber Pieces | 13.75\% | 159 |
| Cardboard | 9.43\% | 109 |
| Tape | 7.96\% | 92 |
| Vape | 4.33\% | 50 |
| Pencil | 3.20\% | 37 |
| Clothes | 2.25\% | 26 |
| Dog Poop Bag | 2.16\% | 25 |
| Wood | 1.90\% | 22 |
| Metal | 1.82\% | 21 |
| Lollipop Stick | 1.64\% | 19 |
| Fabric | 1.56\% | 18 |
| Cloth | 0.95\% | 11 |
| Cigarette Packs | 0.87\% | 10 |
| Tissue/Kleenex | 0.78\% | 9 |
| Needle | 0.78\% | 9 |
| Ziptie | 0.52\% | 6 |
| Organic Waste | 0.52\% | 6 |
| Jewelry | 0.52\% | 6 |
| Cigar | 0.52\% | 6 |
| Toy | 0.43\% | 5 |
| Pen | 0.43\% | 5 |
| Balloon | 0.43\% | 5 |
| Screws | 0.35\% | 4 |
| Pipe | 0.35\% | 4 |
| Car Part | 0.35\% | 4 |
| Lighter | 0.26\% | 3 |
| Glove | 0.26\% | 3 |
| Band-Aid | 0.26\% | 3 |
| Vinyl String | 0.17\% | 2 |
| Vape Pod | 0.17\% | 2 |
| Tube | 0.17\% | 2 |
| Stickers | 0.17\% | 2 |


| ITEM | TOTAL <br> PERCENTAGE | TOTAL |
| :---: | :---: | :---: |
| COUNT |  |  |

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