Diagnosis of the level of student support for campus-wide removal of bottled water

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Executive Summary

The goal of this research project was to determine the level of student support at Dalhousie for the removal of water bottles from vending machines and food service locations on campus. The results showed that more than 70% of students were in favour of removing bottled water from vending machines, food service locations, or both. Although the majority of students are in favour of a ban, there are certain barriers that need to be addressed prior to banning bottled water outright. Many other universities and communities are striving to restrict the sale of bottled water or already have implemented a ban. SustainDal's Water Committee implemented a two-phase timeframe in 2009, over the course of which they hope to see a ban on the sale of bottled water on all Dalhousie campuses. Student feedback is a crucial component in determining whether or not banning bottled water is a good change to implement. Intercept surveys were conducted on all three Dalhousie campuses in a haphazard and purposive fashion in order to gain a representative sample of 376 surveys. The surveys were cross-examined to express relationships between campus used, faculty and year of study. The surveys were coded and analyzed using Excel. It was found that the majority of students do not buy bottled water on campus, and those that do usually do so infrequently. Recommendations for action and future research were discussed. These recommendations include infrastructure upgrades and increasing awareness. The results will be used in SustainDal's efforts to ban bottled water on campus.

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1.0 Introduction

1.1 Background Information & Literature Review

The Sustain Dal office combined with the College of Sustainability and Environment proposed a survey of Dalhousie students regarding banning bottled water from vending machines and food services on campus in 2009 (Carter, Cogswell & Dyer 2009). Dalhousie's College of Sustainability and the Environment, founded in 2009, is the first of its kind among Canadian Universities (Horrocks 2009). From within the College the Sustainability and Society program was initiated, striving to introduce and implement initiatives which meet the standards of Dalhousie Sustainability policy. Therefore, one of the primary goals has been to ban the use and sale of bottled-water from vending machines and food services locations on campus (SustainDal Water Committee, 2009). This initiative is being implemented in two phases: the first being infrastructure and maintenance improvements to existing public water locations, the second is a restriction of Dalhousie funds to procure the sale of bottled water on campus. Dalhousie's commitment to banning bottled water on campus as a part of a national effort lead by municipalities and universities across Canada (SustainDal Water Committee, 2009).

A number of Canadian municipalities and universities have recently started to address issues surrounding the consumption of bottled water. Addressing their continuing environmental responsibilities, several municipalities and universities have banned the sale of bottled water on campuses and city premises (SustainDal water committee, 2009). More than 17 municipalities from five provinces have banned the sale and distribution of

bottled water on city premises while another 45 have indicated significant interest in doing so (Carter, et al, 2009). Subsequently, it is not surprising that this ban is a Dalhousie priority. The following are examples of strategies and projects that have already been implemented in Canada and around the world.

Toronto:

In 2008, the city of Toronto eliminated the sale and distribution of bottled water on city premises. The city not only took the initiative to eliminate the product, but also made a commitment to ensure fundamental access to tap water in all city facilities. In doing so, Toronto became the largest city in the world to pass such extensive regulations eliminating the use of bottled water (Clarke, 2008).

Nova Scotia:

The city of Halifax has implemented a ban on the sale and distribution of bottled water in all municipal buildings as of 2011 (Carter, et al, 2009).

Last year, the municipality of Barrington made a decision to remove all bottled water in municipal facilities. This came primarily as the result of a broad-based coalition of organizations in Nova Scotia who launched the "Campaign to Turn on the Tap and Ditch the Bottle." The municipality anticipates a savings of $100 per month and will serve as a model for other local governments (Allen, 2009).

Other Municipalities:

Other municipalities showing similar initiatives are: Edmonton AB; Burnaby BC; Nelson BC; Vancouver BC; St John's NL; Brockton ON; Blue Mountain ON; London

ON; Owen Sound ON; St. Catherine's ON; Waterloo Region ON; Charlottetown PEI;

Toronto ON (Carter, et al, 2009).

Universities:

A student referendum at the University of Leeds in December 2008 voted overwhelmingly to ban the sale of bottled water in the Student Union building, including its bars, cafes and shops. The motion was put forward by "People and Planet", a student group aimed at raising awareness of environmental issues. Leeds is the first university in the UK to implement such an initiative (Wainwright, 2008).

Concordia University and the University of Guelph have both worked over the past few years to implement water bottle "free zones" on their campuses (GSEC 2008). Guelph students belonging to the organization "Tap-in" worked alongside student union officials to create more than 12 bottled water "free zones" since 2008. One of the biggest issues Guelph's "Tap-in" members face is mitigating students ability to "choose" where they get their water on campus; an issue that exist today at Dalhousie (GSEC 2008).

A working group called TAPTHIRST has been campaigning against the use of bottled water at Quebec's Concordia University since 2008. TAPTHIRST is part of a non-profit organization called Quebec Public Interest Research Group (QPIRG), a group which has been active in raising awareness and motivating grassroots activism around diverse social and environmental issues (QPIRG, 2007). So far TAPTHIRST has only been able to enact three bottled water "free zones," facing many challenges in reworking a system which faces significant bureaucratic red tape (QPIRG, 2007).

1.2 Project Rationale

Dalhousie's commitment to banning the sale of bottled water encompasses addressing the economical, sociological, environmental and ethical concerns which are associated with bottled water (SustainDal, 2009). Bottled water is a recent phenomenon which began in France in 1968 but did not gain popularity until well into the late 1980's (Horrocks, 2009). Canadian figures put bottled water at nearly 10% of the total beverage market share, competing heavily with soft drinks, wine and spirits (Carter, et al, 2009). Despite these numbers, there is growing dissent against the bottled water industry as communities and universities mentioned above continue to restrict the use of bottled water due to its many detrimental ramifications. Many of these groups consider bottled water to be a commodity and not a necessity (Horrocks, 2009). Therefore, it does not make sound logical, economic or environmental sense to stroll past a free fountain or tap to purchase a bottled version which exhibits a mark-up of up to 10 000 times public water. This fact is exacerbated in light of the fact that Canada was ranked second only to Finland according to the United Nations rating of public water quality (Stevenson, 2003). Furthermore, the environmental implications of bottled water are staggering; currently it takes 17.5 kg of water to produce 1kg of plastic bottles. Estimations also suggest that three litres of water are required for every one litre of water sold (Horrocks, 2009). Therefore in consuming bottled water we are also consuming large levels of oil and water for no rational reason other than status and convenience, of which the latter can be solved by good management.

The political and social implications existing around the international bottled water industry have also become much more apparent in the last decade. Not all countries have access to, or can provide, cheap, safe, readily available public water. This reality has forced many global citizens to turn to bottled water for their source of clean water; paying a crippling amount for it (Clarke, 2008). Therefore, in a country which has access to cheap safe drinking water, it is illogical and immoral to support an industry which pollutes our planet and takes advantage of citizens who have no other choice.

The proposed survey is just another step towards gathering the data and support needed to fulfill our bottled water initiative and continue in our progression towards sustainability. Currently new public water fountains are being installed around campus, infrastructure and water quality is being tested, and contract negotiations are in motion (SustainDal, 2009). The campus-wide survey is just another piece of the puzzle needed to implement action which is gaining momentum across Canada and around the world.

A potential campus-wide bottled water ban proposal has already been constructed, it consists of four phases outlining how a ban should be implemented (DSUSO and sustain Dal Water Committee, 2009). These include:

1. Dalhousie must ensure that there is public access to safe water on campus, specifying that no old water fountains may be removed without replacement by a new fountain and that all new fountains must be wheelchair accessible.

2. No more Dalhousie funds may be spent on the purchasing of bottled water for sale on campus; all food service contracts must exclude bottled water.

3. All contracted vendors on Dalhousie campuses are prohibited from selling bottled water on campus.

4. Bottled water sale banned on all locations on campus, ensuring that vendors have access to public water so as to meet demand for water (DSUSO and sustain Dal water, 2009).

We believe that it was worth investigating the amount of student support on campus for banning bottled water because Dalhousie administrators have a responsibility to sustainability and to their main clients, the students. If the results demonstrate that students do support the removal of bottled water, it would help to justify, facilitate and ameliorate the process of implementation. A ban would be would significantly reduce the amount of campus waste and support for polluting multinationals. Furthermore, a ban on bottled water in Dalhousie would reduce the campus ecological footprint, setting an example as a leader in sustainability, both of which are goals of the Dalhousie sustainability policy (Dalhousie Sustainability Policy, 2009).

1.3 Project Definition
The research question we are attempting to answer is: what is the level of student support for the removal of bottled water from vending machines and food service locations on the Dalhousie campus?

The four objectives and goals of our project are as follows:

- Diagnose the level of student on all three Dalhousie campuses for the removal of bottled water from vending machines and food service locations around campus.

- Identify students' main method of water consumption while on camps.

- Determine students' rationales for using water bottles and reusable water bottles on campus.

- Discover what barriers exist surrounding a water bottle ban on campus.

For the purposes of this research project, we defined bottled water as water sold in single-use plastic bottles and banning is defined as the prohibition of sale on campus. Dalhousie has made the initial steps towards banning bottled water on campus; this report is intended to further the past work that has already been done by collecting data from a wider array of the students and then interpreting this data. The Aramark food services student supported survey focused only on management students, and showed a significant degree of support for the ban of bottled water on campus in that faculty. In order to achieve the goal of comprehensively understand the level of support for the banning of bottled water, we broadened the scope of the survey in an attempt to create a larger picture of student attitudes towards a bottled water ban on campus. In order to capture the opinions of the entire Dalhousie student body, surveys will be conducted on all three campuses in major academic buildings and at food service locations. Areas where large numbers of diverse students congregate such as the LSC and the student union building were especially targeted.

The survey that was built upon was performed in 2009 by Aramark food services; a feasibility study was conducted which involved the surveying of management students at Dalhousie and research on water bottle bans at other academic institutions and in municipalities. The surveys of management students came back with positive results, showing that 81% of students prefer to use reusable water bottles instead of purchasing single use bottles (Carter et al 2009). It also demonstrated that several of the largest barriers to a ban may not actually be physical barriers but simply lack the means of implementation due to monetary constraints. Only 26 % of Management students actually rely on the purchase of bottled water for water consumption on campus and of these

students, 63% would switch to water fountains if bottled water were removed (Carter et al 2009). These observations support the prediction that students will be receptive to a ban on bottled water on the Dalhousie campus.

1.4 Report Outline

The methods section explains that surveys were performed using an intercept method and focused on what water source students use most on campus, reasoning behind their choices and general opinions on removal of bottled water from campus. They also explain how we carried out our data collection. Results helped define the amount of support among students on all three campuses for banning the sale of bottled water. The results of the survey are aimed towards Dalhousie administrators in an effort to prove that a bottled water ban is something that students support. The results are displayed in a series of tables and charts that outline significant findings. One of the strengths of this survey and project is that it was constructed so that if there was negative feedback concerning the ban, the survey would help describe major barriers to a campus wide bottled water ban by illustrating what needs to be done in order to change this perception on campus and come to a solution. The discussion explains the significance of the project results and how they relate to the research question and objectives, analyzes some of these barriers and provides possible solutions for them. Finally, it also compares these findings to those of the Aramark study. The conclusion will provide recommendations for future research and how to implement the proposed changes no campus.

2.0 Methods

This section of the report will outline the methods used to carry out research for the project, which was completed in two phases: literature analysis and data collection. A 2009 Aramark survey was closely examined prior to finalizing the research methods, and data was collected from it as a comparative baseline for the data collected in our project. Intercept surveys conducted on all three Dalhousie campuses served as a qualitative means of obtaining data for our research. As part of our research proposal, detailed schedule (Appendix A) was created prior to commencing any research to establish a timeline for our methods.

2.1 Limitations & Delimitations

Project limitations are identified as uncontrollable circumstances that may affect the results of the study, or limit its scope (Palys &Atchinson, 2008, ch5). Temporal limitations, such as lack of time, affected data collection and the efficiency of research methods by limiting the amount of survey data that was ultimately possible to collect. Other limitations included lack of student engagement marked by their unwillingness to fill out the survey or participate in the study at all.

Delimitations are imposed conditions that restrict the scope of the study, including: variations in data accuracy due to sample size, and sample location (Palys &Atchinson, 2008, ch5). In the case of our project, delimitations in data accuracy arose out of the sample size and the distribution of the amount of surveys on each campus and for each faculty. Each campus was not proportionally or accurately represented, nor was it proportional for each faculty. We did not strive to gather proportional representation of faculties because it would have been to time consuming trying to find a specific number

of students from each faculty. The same is true for year of study and main campus used. Since out client wanted us to gather as many results as possible, we decided that it would be more effective to haphazardly survey people. The potential for human error in data analysis also stood as a barrier to accuracy, as data would greatly be devalued if mistakes were made. We also limited ourselves to the amount of time allotted for surveying: a week was designated as the time frame to gather all of the results.

2.2 Step One: Aramark Survey Review

A 2009 study completed by Aramark which sought to diagnose the level of student support for a campus-wide water bottle ban was used as a comparative baseline for our study. This study was conducted among students in the Faculty of Management, and did not include any students from other faculties within the Dalhousie community. Because of this, the two studies varied in their results as trends of student behaviour differed across the spectrum of academic programs offered at the school. Regardless, by analyzing the results from the Aramark study, we were able to evaluate which questions on their survey ought to be included in ours, and which ones need to be changed or omitted altogether. The survey was also used as a comparison tool to compare and contrast similarities in Aramark data with data from our own study. Since both studies were administered on the Dalhousie campus, we expected the results to be similar with slight variability based on the smaller sample size of the Aramark study. The Aramark study was reviewed prior to administering any new surveys, which allowed us to make predictions about future results. The Aramark survey is attached in Appendix D

2.3 Step Two: Create the Survey

The second step in our research methods was to create the survey that would be administered on all three Dalhousie campuses to assess the level of student support for a

campus-wide ban on the sale of bottled water. Some of the questions included in the

survey were paraphrased from the Aramark study as we determined that they were

appropriate for our study. Many of the questions on the final survey were included at the

request of our client, and the remainder were included to obtain as much knowledge as

possible about student motivation and purchasing habits of bottled water. The first four

questions: "Are you a Dal student?", "On what campus do you spend most of your time",

"What faculty are you in?", and "What year of study are you in?", were used to establish

correlations between campus used, faculty, and year of study. General questions in the

survey were also important, as they allowed us to highlight any correlations between the

sale of disposable water bottles and campus location. The ethics form and the final copy

of the survey can be found in Appendix B and C respectively.

2.4 Step Three: Conducting the Survey
When the survey was finalized, each group member pilot tested it on a colleague to

assess its flow, relevance and length. Changes were made to the survey based on

feedback from the piloted surveys, and the results were not included in the final data.

Before administering any of the surveys, a copy of the survey was sent to our client,

Gillian Pritchard, to allow her to make any final changes before we started administering

them on campus.

The surveys were conducted in an intercept manner, in various locations on Studley,

Carelton and Sexton campuses, and were targeted toward any Dalhousie student

regardless of faculty or year of study. Initially we planned to do intercept surveys in

conjunction with in-class questionnaires, however the latter proved to be too much of a

logistical challenge. On Sexton campus, the surveys were administered in the "B"

building at the food service location and in the Medjuck building in the main lobby area. Surveys at the Carleton camps were administered in the Tupper link at the Tim Hortons, and in the Dentistry building lobby. On the Studley campus, surveys were administered at the Tim Hortons and Just Us kiosks in the Student Union Building, at the Tim Hortons and the food court in the Life Sciences Centre and at the Second Cup in the Killam Library. Our team split into three groups of two to alleviate the pressures of doing independent research, and spent several days on each campus administering the surveys until we reached our 95% confidence interval of 376 surveys. We established this value by computing a 95% confidence level for a population of 16,000 students. Since our sample size will be representative, we will be able to extrapolate our results to the entire student population of Dalhousie. See figures 1A, 1B and 1C for maps outlining where surveys were conducted.
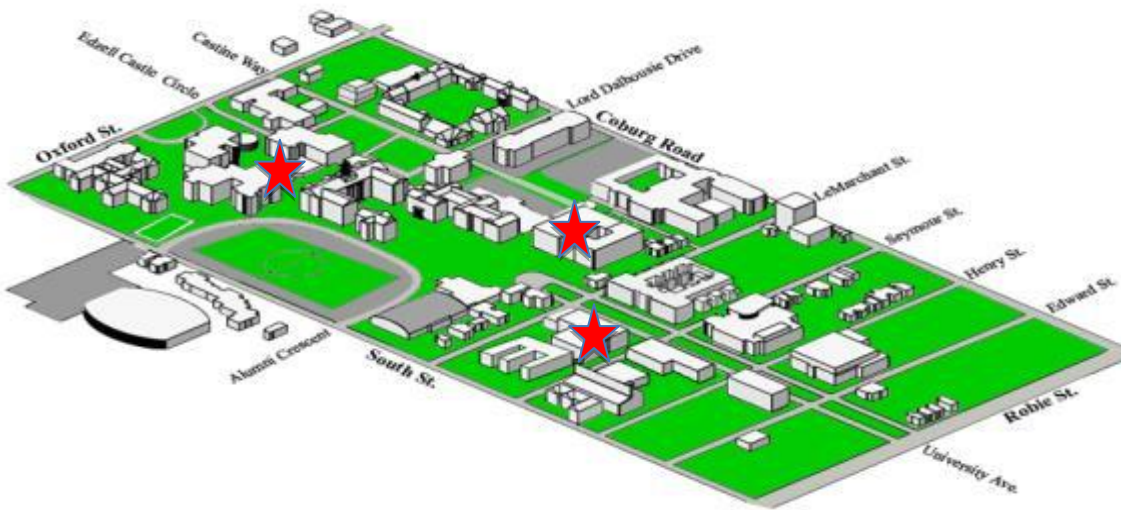
Figure 1A: A map of Studley campus indicating where surveys were conducted. The stars highlight the buildings in which surveys were administered.
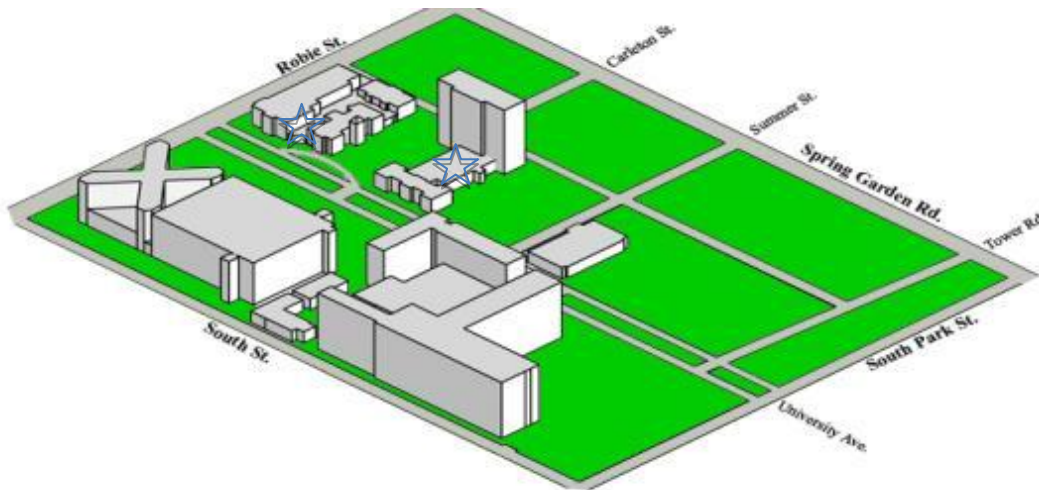

Figure 1B: A map of Carlton campus indicating where surveys were conducted. The stars highlight the buildings in which surveys were administered.
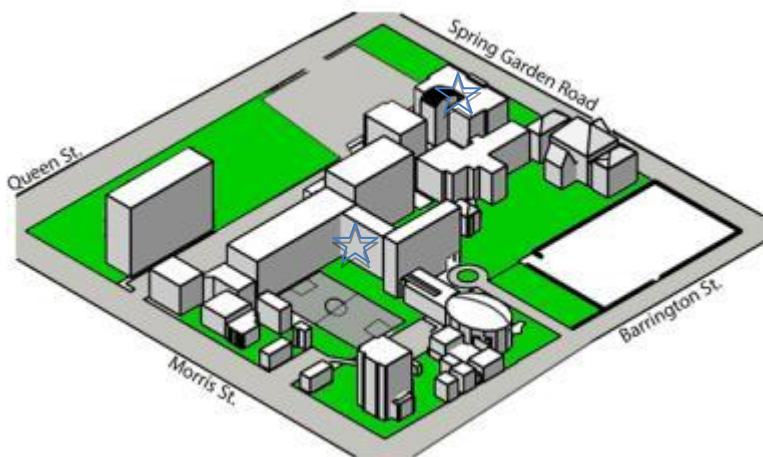

Figure1C: a map of Sexton campus indicating where surveys were conducted. The stars highlight the buildings in which surveys were administered.

Instead of gathering a proportionate sample, we applied a sample strategy that was a mix of purposive and haphazard research methods. Our sampling was purposive because we stationed ourselves near food service locations in order to increase efficiency and the number of students intercepted. The sampling was also purposive because we intentionally administered surveys on each of the three campuses to obtain as random a sample as possible (Palys &Atchinson, 2008, ch4). By administering surveys on every campus, we hoped to obtain results from students belonging to each faculty.

Our survey was haphazard because our target demographic was extremely broad, targeting students in any faculty, in an attempt to reach as many people as possible (Palys &Atchinson, 2008, ch4). We chose to do survey in an intercept manner in order to eliminate bias when it comes to who completes the survey. For example, it would be likely that students in favour of banning bottled water would fill out an online survey or approach a surveying station over students who did not care about the subject manner.

External validity, the ability to generalize the results to a larger population or in a different context, was attained by testing a random sample and extrapolating that data to pertain to a larger population (Palys &Atchinson, 2008, ch2). In this way, we can assume that if a different research team administered our survey to a larger group of students at Dalhousie, the results would most likely be very similar, unless their methods contained some sort of bias. The potential for bias in our results was limited by having all survey administrators follow the same research protocol, which enhanced the overall reliability of the results. Each member of the group was responsible for coding a specific section of

the data and inputting it into an Excel document to maintain consistency. One group member was responsible for coding all qualitative, word-based answers on the survey in order to ensure consistency. A preliminary survey session was conducted by each group member, wherein they spent one hour administering as many surveys as possible to gauge the feasibility of accomplishing our survey goals, and to estimate how long it would take to reach the desired amount.

2.5 Step Four: Survey Analysis
Once all the surveys were complete, the data was coded and organized in an Excel document. This was an extremely efficient means of highlighting comparisons between campus used, faculty, and year of study and survey results. Once the data was coded in Excel, we displayed the findings in graphs and tables, to give a visual representation of the degree of student support for the removal of water bottles from vending machines and food service locations on campus. Once this was done we were also able to compare the results with the results from the Aramark survey. The studies produced similar results, which was indicative of appropriate research methods and strategies.

2.6 Homology and Heterogeneity
The homologous aspect of our study was our survey sample, which included all students from Dalhousie University. These results were also homologous to the Aramark study as Dalhousie students were the target sample of that study as well. We employed multiple heterogeneous features in the project as well which were faculty and year of study. Since we observed both homologous and heterogeneous characteristics of the sample, we were able to draw more detailed conclusions from our results (Payls&Atchinson, 2008, ch4).

3.0 Results

In order to obtain proportional representation, as discussed in the methods section, of the Dalhousie campus population, 376 surveys were administered. By analyzing the responses to these surveys across differing factors it is possible to gain insight into student opinion on campus and what may be influencing these opinions. The surveys were designed for Dalhousie students, and questioned the respondent's most frequented campus, faculty and year of study. The results were analyzed across all of these factors; it was found that looking across faculties did not provide useful information because the representation from individual faculties was not proportional which skewed data. This is explained in more detail in the discussion section. In this section, detailed results will be provided for analysis of main campus and year of study. A complete table of the raw data can be found in Appendix E.

3.1 Methods of Water Consumption on Campus

First, it was important to get an idea of how the student population is currently consuming water on campus. The survey's first three questions were designed to determine the frequency of each water consumption method on campus. By comparing the frequency of "always" and "never" responses across the different options for water consumption on campus, the most popular and least popular methods of water consumption can be determined. It can be seen that there is a much higher proportion of "always" responses in reusable bottles and water fountain use when compared to bottled water, the opposite of this can be seen in the proportion on "never" responses (Fig 2A).
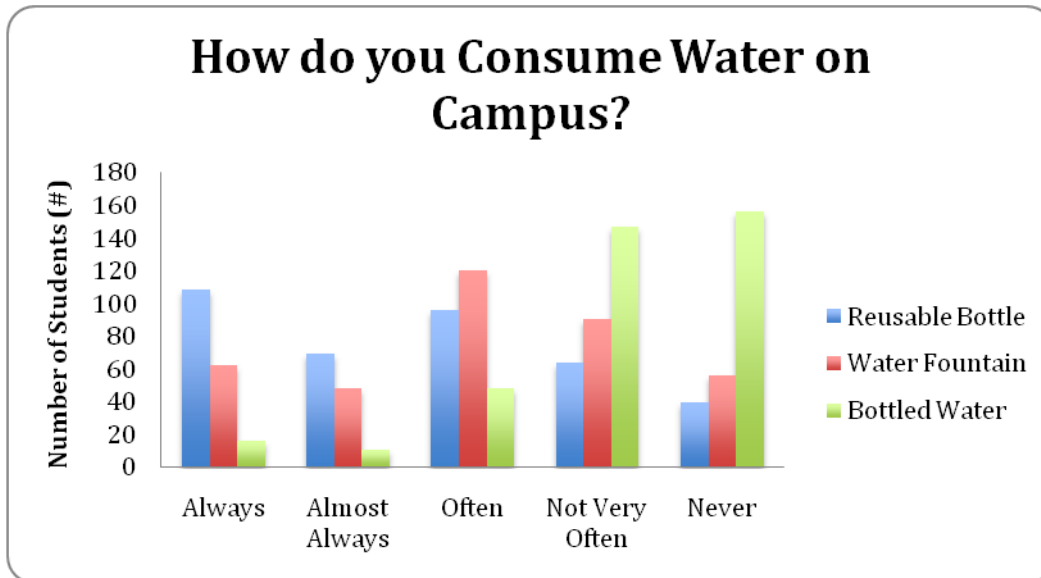
Figure 2A. – Graph showing the results of the first three survey questions, gauging how students consume water on campus. Three different water sources were investigated – reusable bottles, water fountains and bottled water. The above results are a composite total of all three campus' responses.

Similar results were observed when the above results were broken down by campus, suggesting that each campus has proportionally higher amounts of reusable bottle use when compared to bottled water (Fig 2 B, C, D).

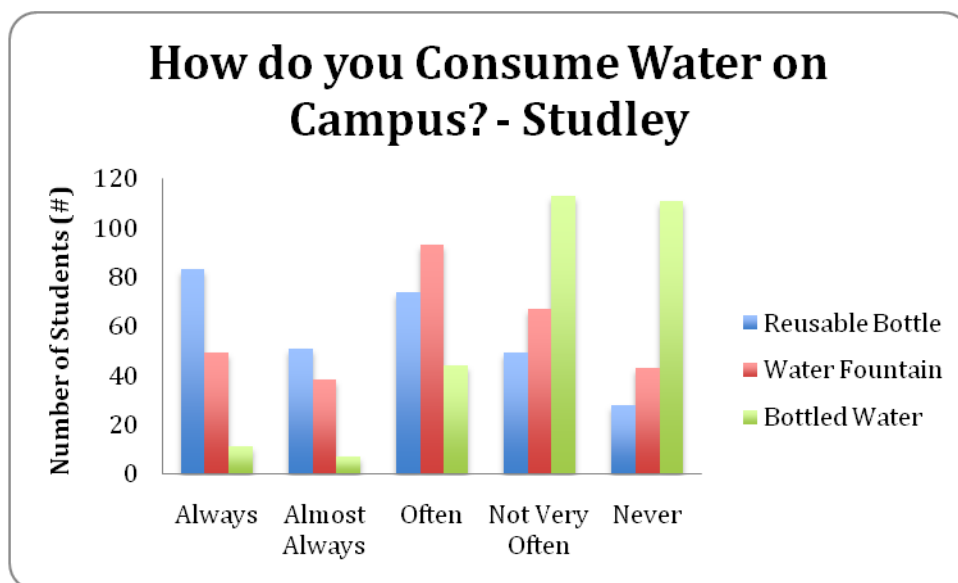

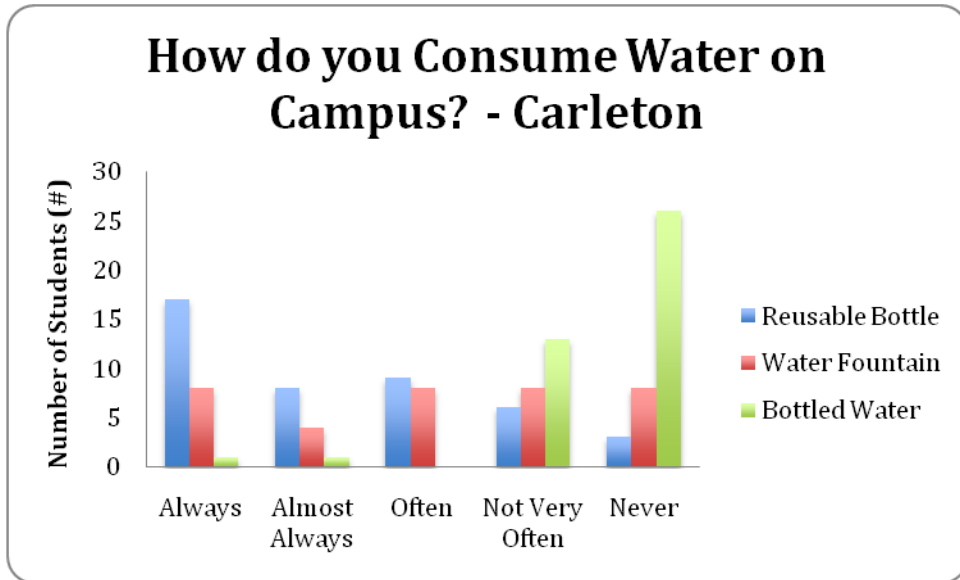Figure 2B. – Graph depicting water consumption choice on Studley campus.

Figure 2C. – Graph depicting water consumption choice on Carleton campus.
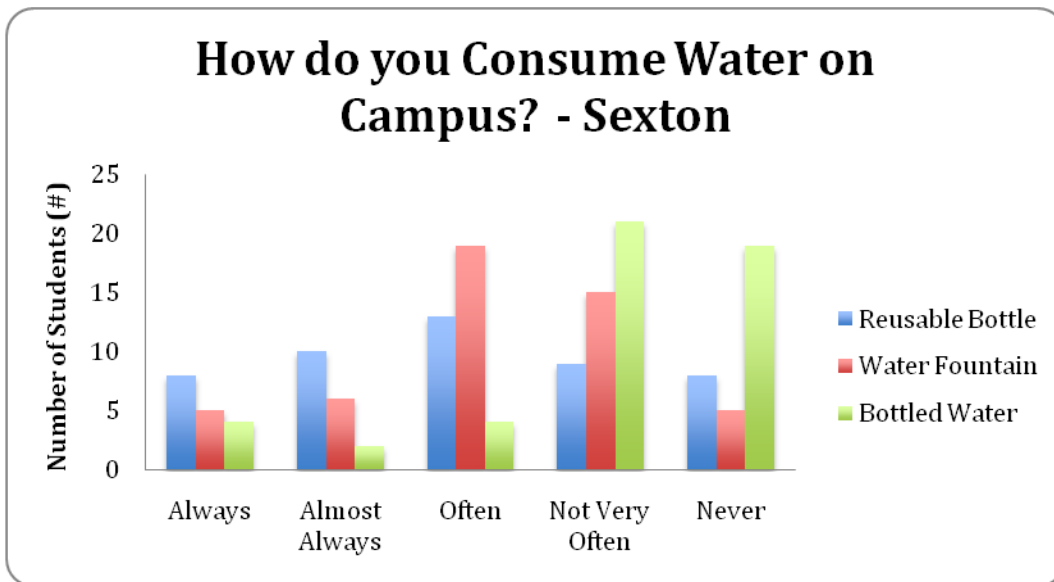

Figure 2D. – Graph Depicting water consumption choice on Sexton campus.

Though the above results do suggest that a lower proportion of people are buying

bottled water, there are certainly still people that purchase bottled water as their main

water source on campus. It is important to note that this question specifically addressed purchasing bottled water on the Dalhousie campus, not just in general. In analyzing the survey responses it was found that the majority of students never purchase bottled water (Figure 3A).

How many times a week to you purchase bottled water?

	Never	1 to 3	4 to 6	7 to 9	10+
Sexton	26	15	4	2	0
Carleton	37	9	1	0	0
Studley	165	98	16	3	0
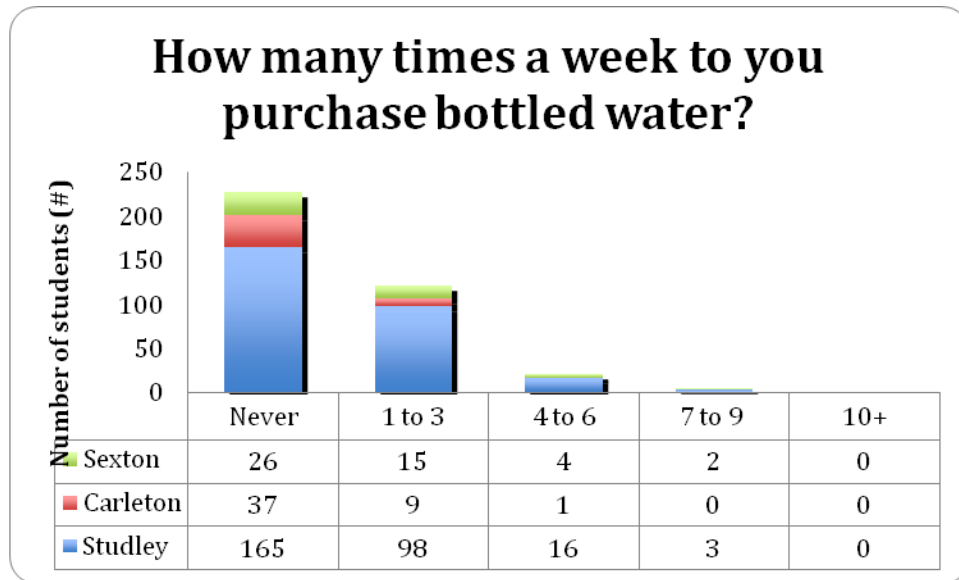
Figure 3A. – Graph depicting the frequency of bottled water purchasing/week, with responses broken down via campus. Studley campus response makes up such a large proportion because most surveys were conducted on this largest campus.

This trend holds true across all three Dalhousie campuses, the results show that most students do not buy bottled water and those that do, do so infrequently with extremely small proportions of students buying bottled water on a daily basis (Figure 3 B, C, D).
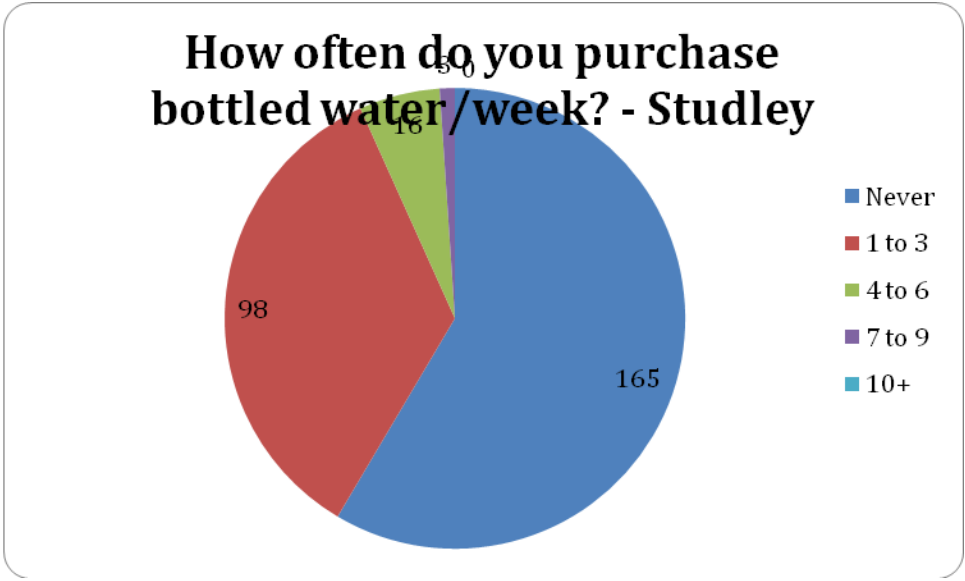
Figure 3B. – Graph displaying the frequency of the purchase of bottled water/week on Studley campus.
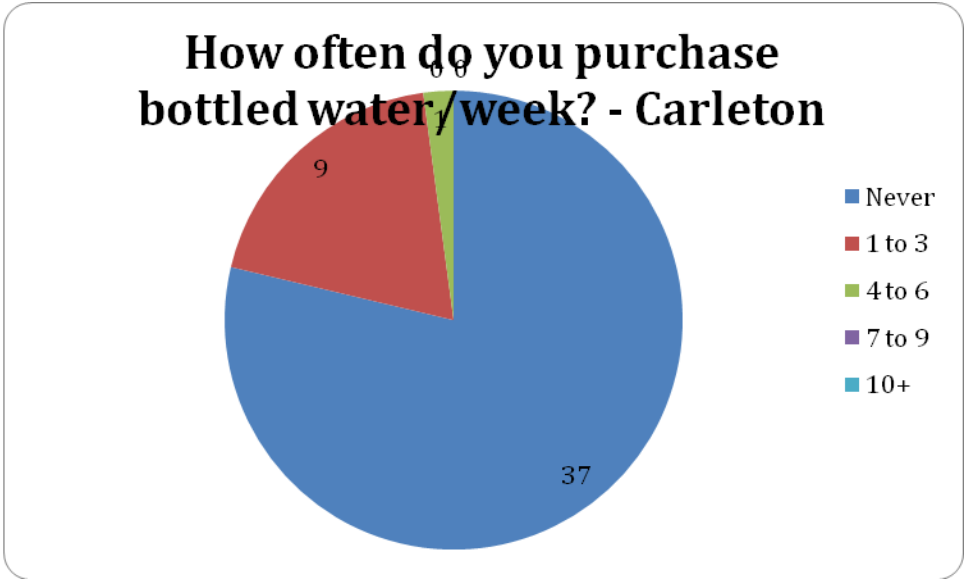
Figure 3C. - Graph displaying the frequency of the purchase of bottled water/week on Carleton campus

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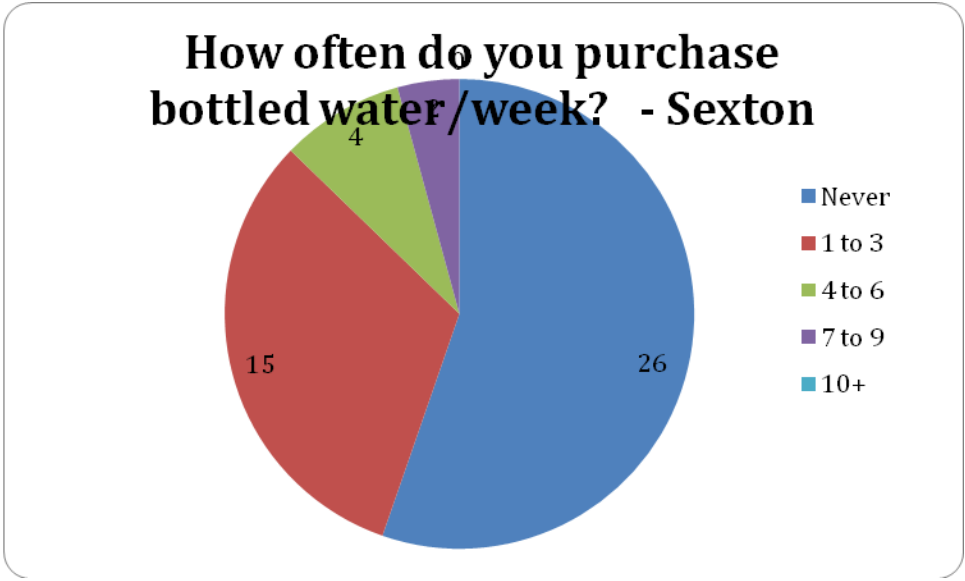
Figure 3D. - Graph displaying the frequency of the purchase of bottled water/week on Sexton campus.

When cross analyzing the purchase of bottled water across year of study it can be seen that year does not seem to have an effect on the tendency to purchase bottled water, as the proportion of responses from each year is relatively equal (Figure 3E).

	Never	1 to 3	4 to 6	7 to 9	10+
Graduate studies	39	12	0	1	0
4th yr+	41	25	3	2	0
3rd yr	53	21	2	1	0
2nd yr	46	21	8	1	0
1st yr	49	43	8	0	0
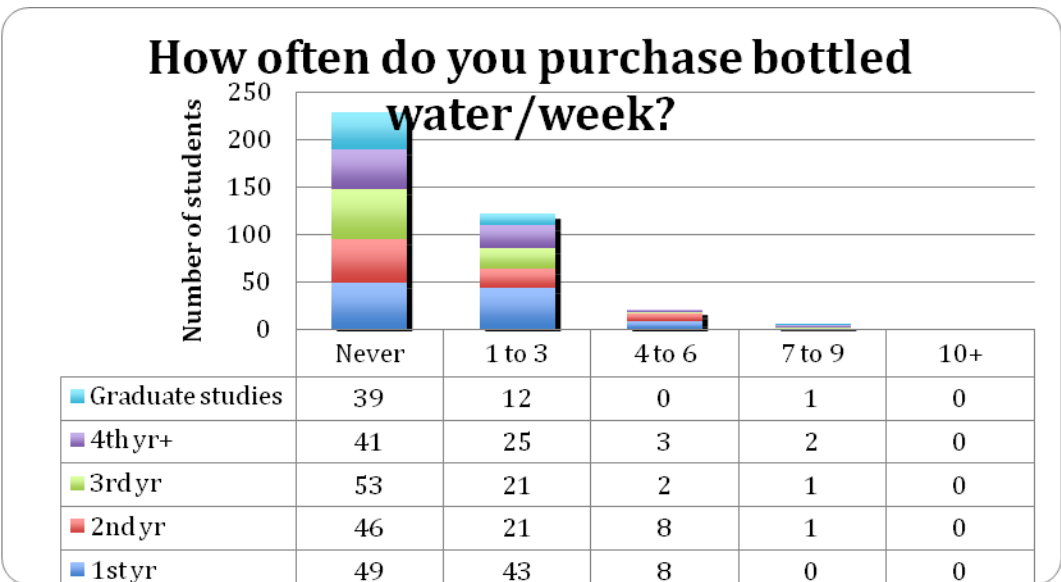
Figure 3E. – Frequency of bottled water purchased/week across all three campus' broken down into year of study.

3.2 Reasoning behind choices

Of those that actually did purchase bottled water on campus, it was important to determine why they did. In analyzing all responses it became clear that the major reasoning behind the purchase of bottled water was the fact that bottled water is convenient (Figure 4A). The large proportion of N/A responses comes from individuals who do not purchase bottled water.

If you purchase bottled water - why do you do so?

	taste	convenience	health conerns with public water	don't know where fountains are	N/A	other
Sexton	3	15	2	4	12	2
Carleton	2	9	1	1	13	5
Studley	21	121	19	19	101	26
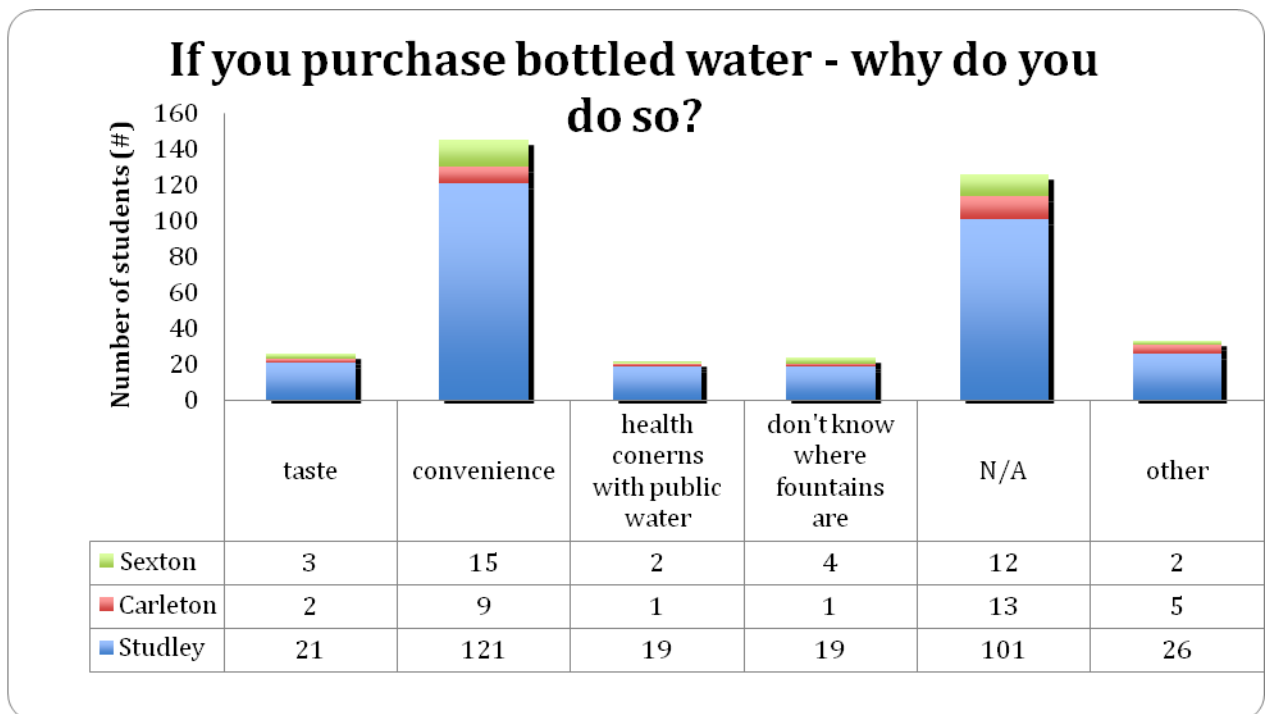
Figure 4A- Reasoning for purchase of bottled water with responses broken down into campus.

This trend can also be observed on each campus individually (Figure 4B, C, D) suggesting that the largest motivation for the purchase of bottled water on campus is the convenience factor.
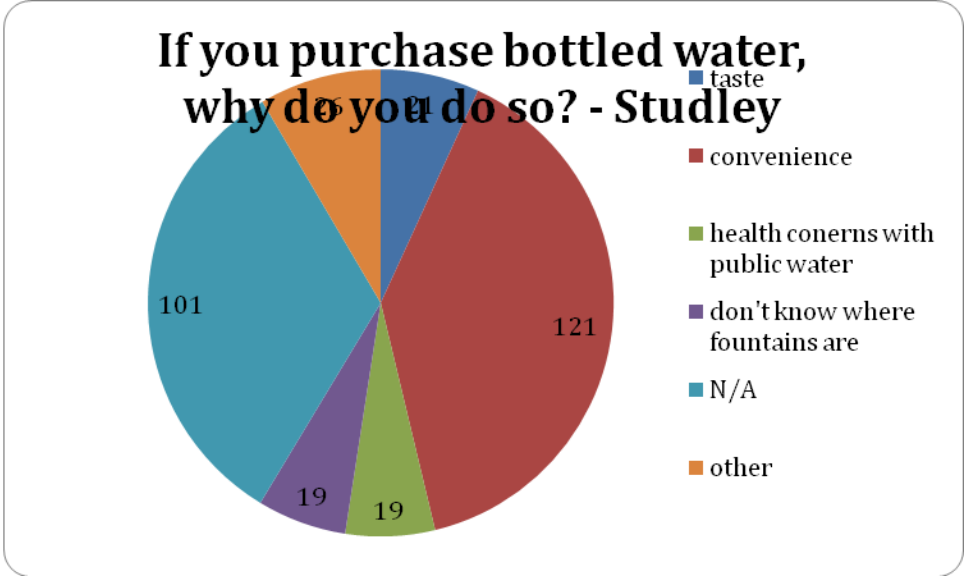
Figure 4B. – Reasoning behind purchasing bottled water on Studley campus.
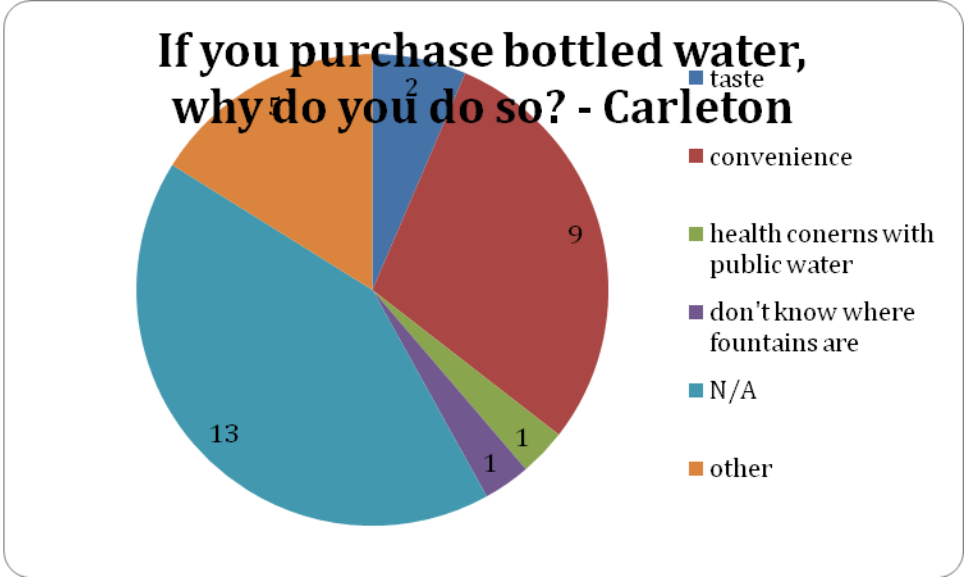
Figure 4C. - Reasoning behind purchasing bottled water on Carleton campus.

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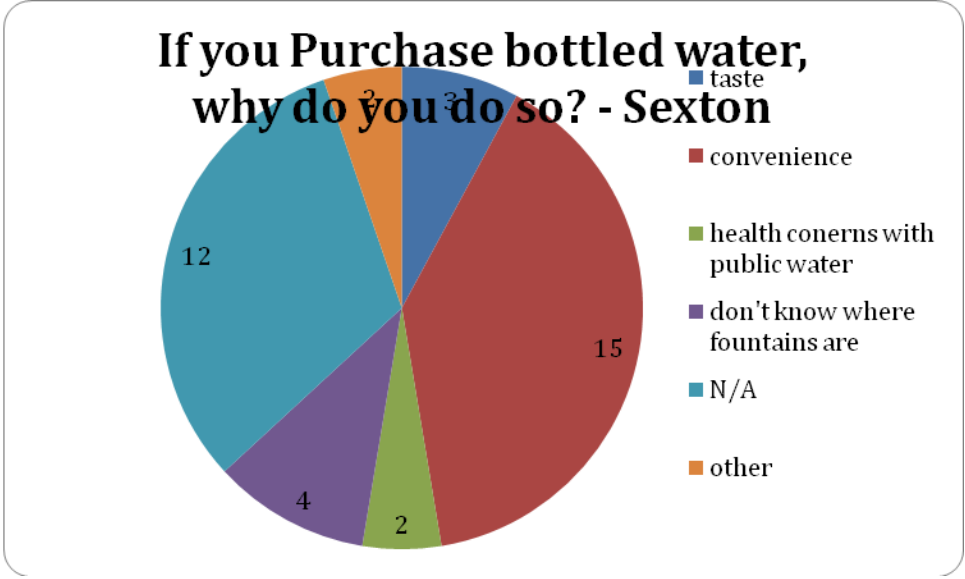
Figure 4D. - Reasoning behind purchasing bottled water on Sexton campus.

The results were also analyzed across year of study, which demonstrates an approximately equal proportion of responses from each year, indicating that the year of study does not change students' motivation to purchase bottled water (figure 4E).
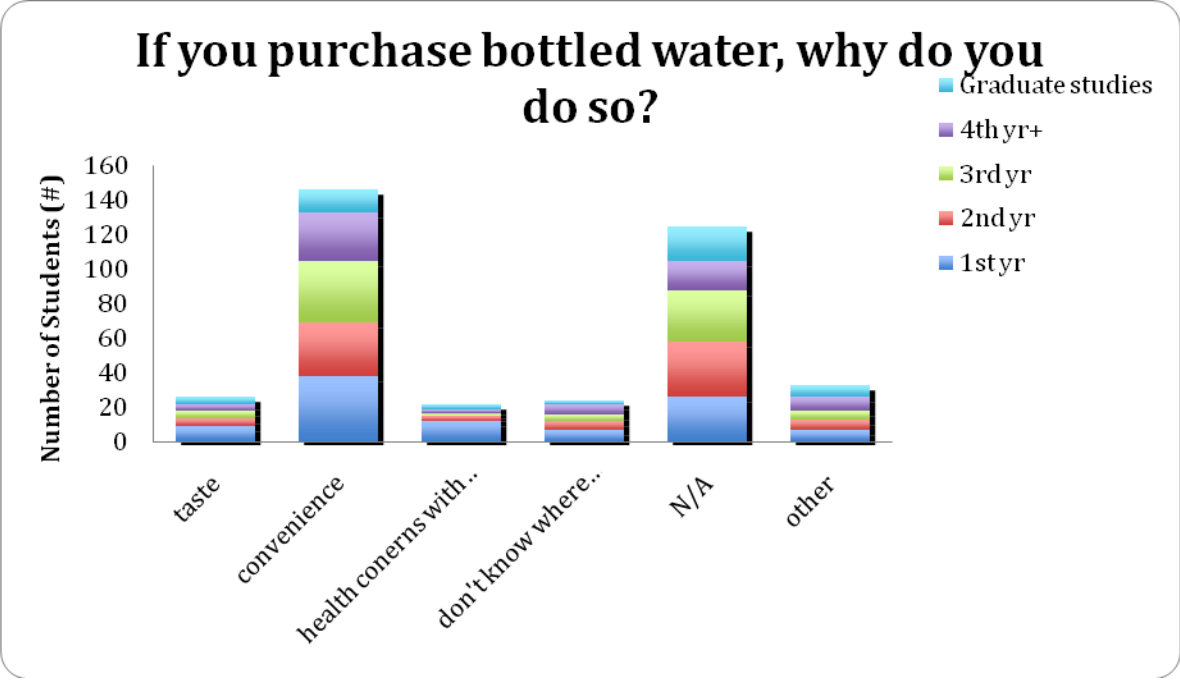
Figure 4E. – Reasoning behind the purchase of bottled water, broken down by year of study.

A large proportion of students on all three campuses indicated that they always use a reusable bottle (Figure2A). The motivation behind this choice was questioned in the survey and the results indicate that the economic and environmental benefits associated with reusable bottles were the major motivators for their use (Figure 5A).

If you use a reusable bottle, why do you do so?

	Don't use one	Cheaper	N/A	Health concerns wth plastics	environme ntal concerns	Other: Convenienc e
■ Sexton	5	24	11	8	20	5
■ Carleton	0	40	7	2	26	1
■ Studley	26	110	9	28	96	10
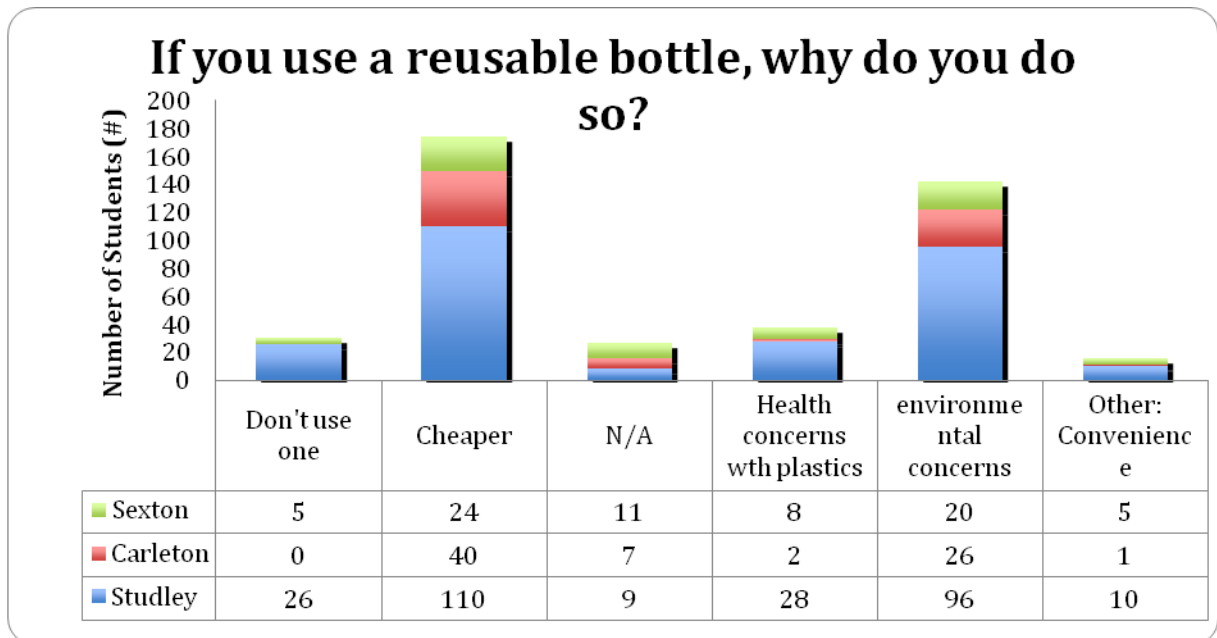
Figure 5A. – Graph depicting all responses for motivation behind a reusable bottle use, broken down by campus.

These two factors made up the largest fraction of responses on all three campuses, and across all years of study (Figure 5 B, C, D, E), suggesting that these factors are important to the entire Dalhousie community.

Figure 5B. – Motivation behind reusable bottle usage on Studley campus.
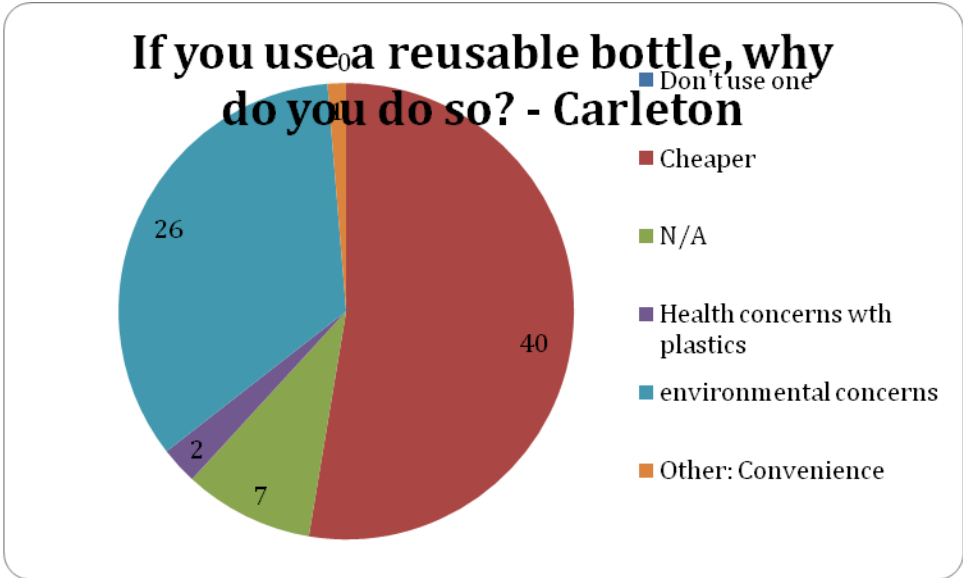
Figure 5C. – Motivation behind reusable bottle usage on Carleton campus.
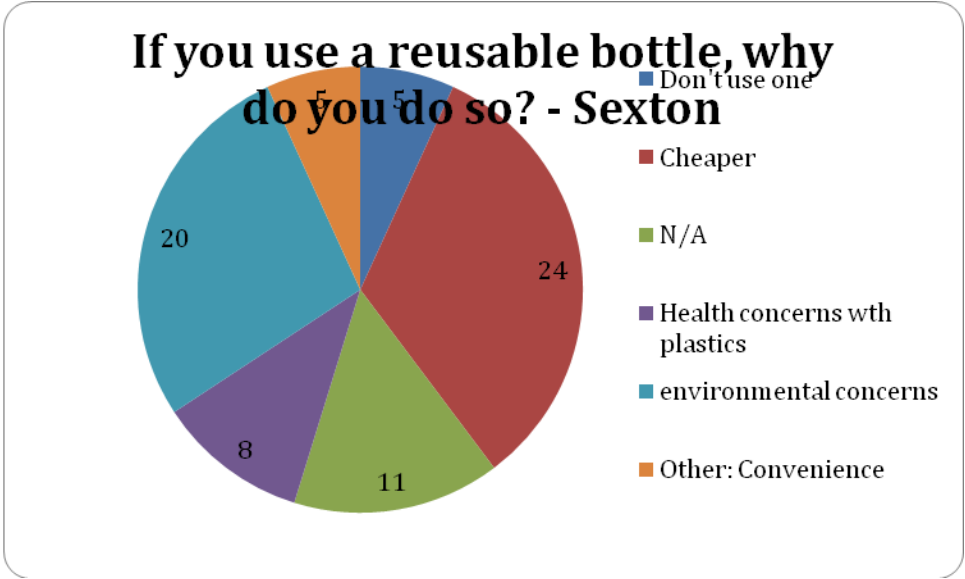
Figure 5D. – Motivation behind reusable bottle usage on Sexton campus.
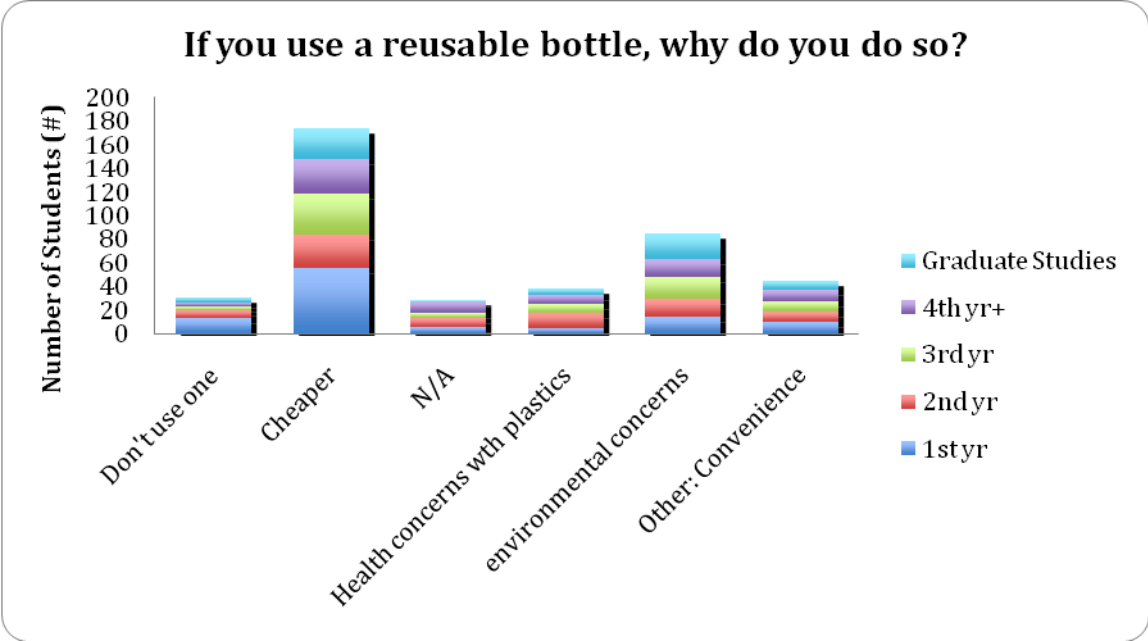
Figure 5E. - All responses for motivation behind a reusable bottle use broken down by year of study.

3.3 New water fountain infrastructure

The survey then asked respondents how likely they would be to use water fountains if they were to be installed at food service locations rather than buying bottled water from that same location. Overall, the largest proportion o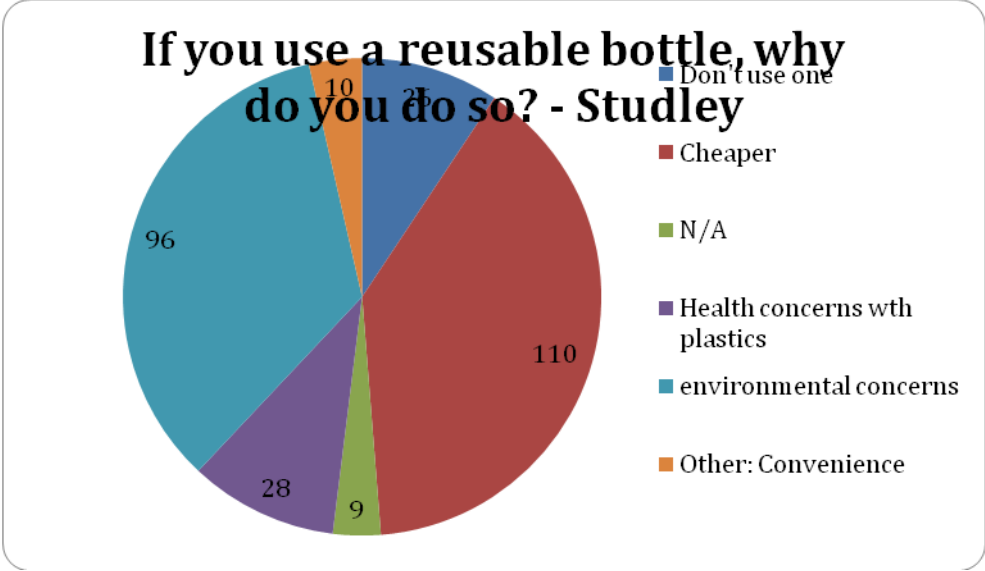f those surveyed responded that they would be very likely to use a water fountain at food service locations, if available, over buying bottled water (Figure 6A).

Water fountain use at FSL

	Very likely	Somewhat likely	Somewhat unlikely	Unlikely
Sexton	17	10	5	5
Carleton	21	5	0	6
Studley	174	79	36	18

Figure 6A. – Graph depicting the likelihood that an individual would use a water fountain rather than buying bottled water if water fountains were available at food service locations (FSL) broken down by campus.

This trend held true across all campuses, with the largest proportion of respondents categorizing themselves as very likely to use water fountains if they were installed at food service locations rather than buying bottled water (Figure 6B, C, D). At both Studley and Carleton campus more than half of the individuals surveyed responded very likely; sexton had just fewer than 50% very likely responses. When broken down by year, the results suggest that year of study does not seem to affect the likelihood of using

31

a water fountain at food service locations, with relatively equal proportions of each

response from each year of study (Figure 6E).

Water fountain use at FSL - Studley

■	Very likely
■	Somewhat likely
■	Somewhat unlikely
■	Unlikely

18
36
79
174

Figure 6B - Likelihood that an individual would use a water fountain rather than buying bottled water if water fountains were available at food service locations (FSL) on Studley campus.

Water fountain use at FSL - Carleton

■	Very likely
■	Somewhat likely
■	Somewhat unlikely
■	Unlikely

6
0
5
21
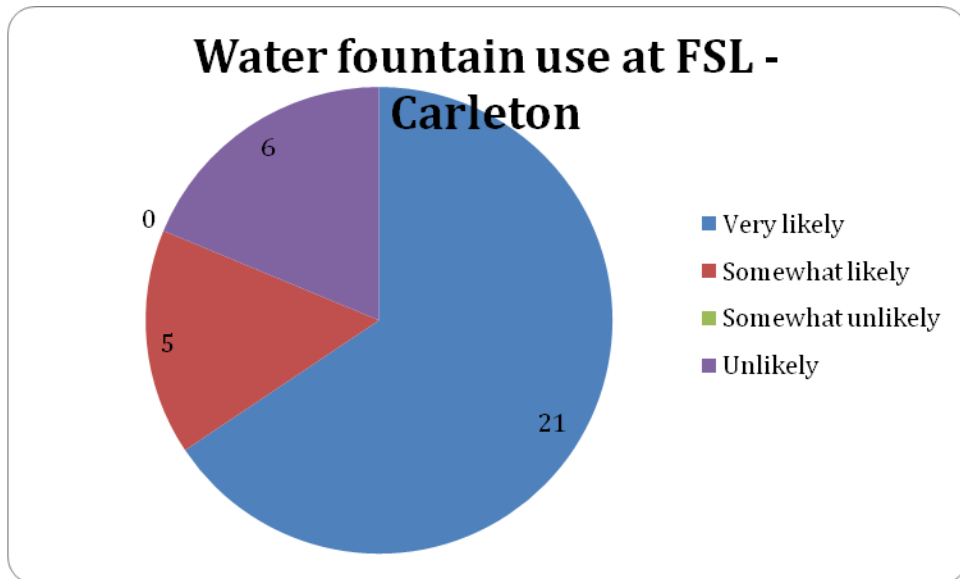
Figure 6C. - Likelihood that an individual would use a water fountain rather than buying bottled water if water fountains were available at food service locations (FSL) on Carleton campus
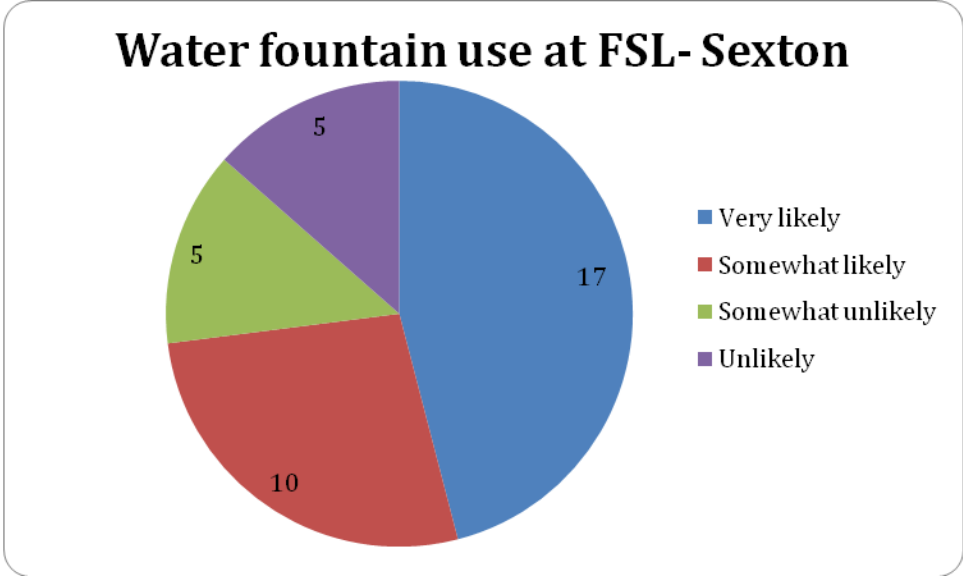
Figure 6D. - Likelihood that an individual would use a water fountain rather than buying bottled water if water fountains were available at food service locations (FSL) on Sexton campus
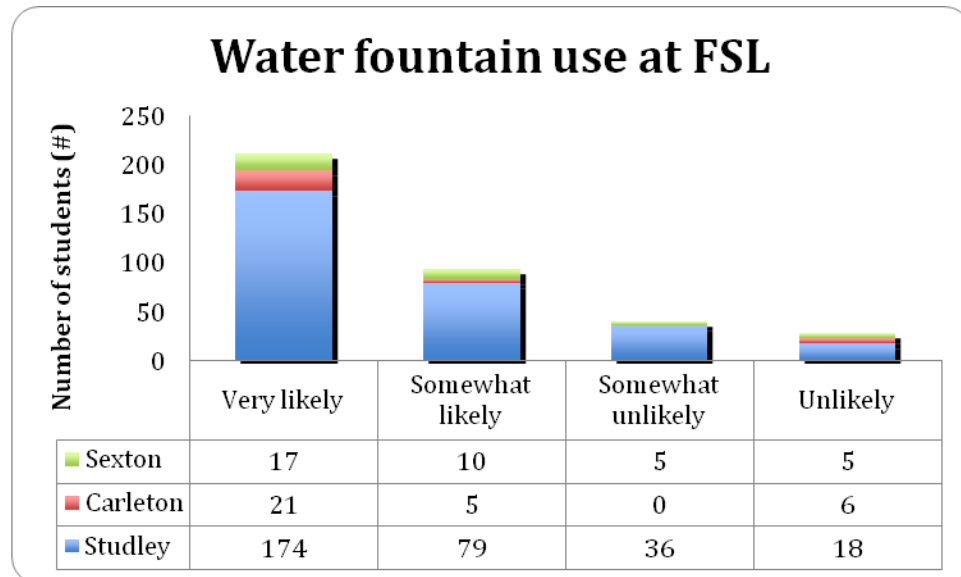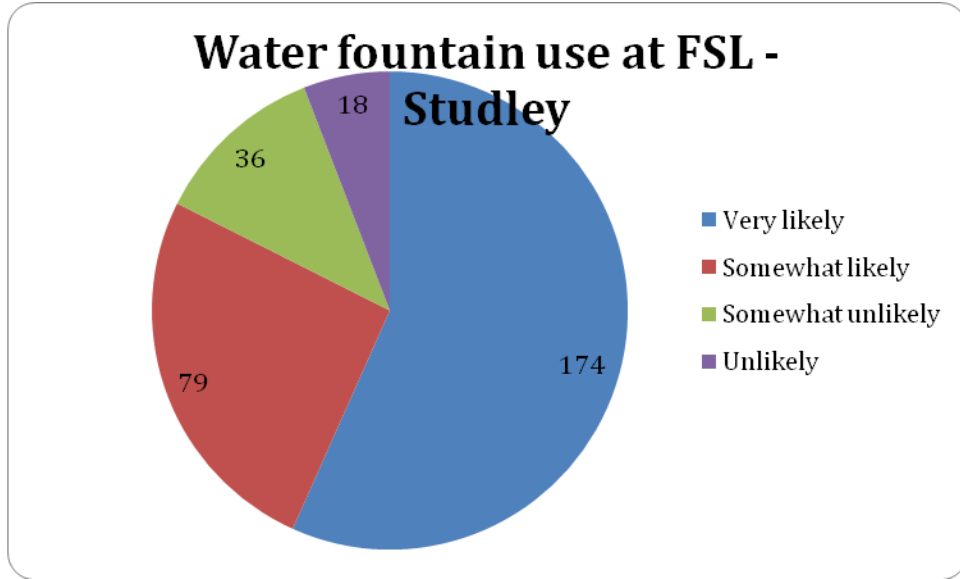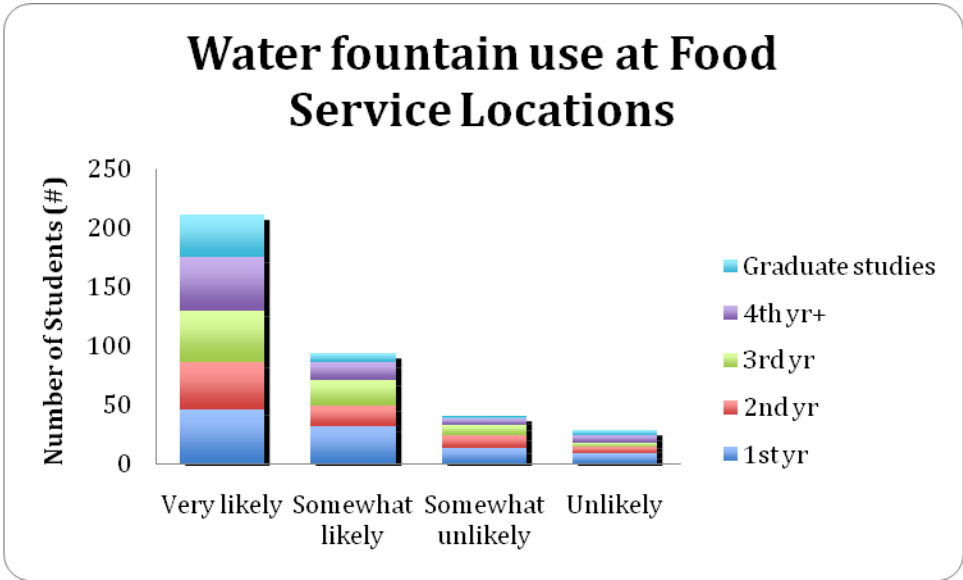

Figure 6E. - Likelihood that an individual would use a water fountain rather than buying bottled water if water fountains were available at food service locations (FSL) broken down by year of study.

3.4 What if water bottles were removed?

A large and legitimate concern with the removal of bottle water from campus is that students would just purchase other bottled products and thus the benefits of removing bottled water would be negated. The survey asked how students would react if bottled water was unavailable to them, and found that the majority of student would use a reusable bottle or go to a water fountain before purchasing another bottled product (Figure 7A).

	Buy Another Bottled Product	Use a Fountain	Use a Reusable Bottle	Go Thirsty	Other
Sexton	16	19	29	0	4
Carleton	6	19	40	4	2
Studley	38	63	122	12	2
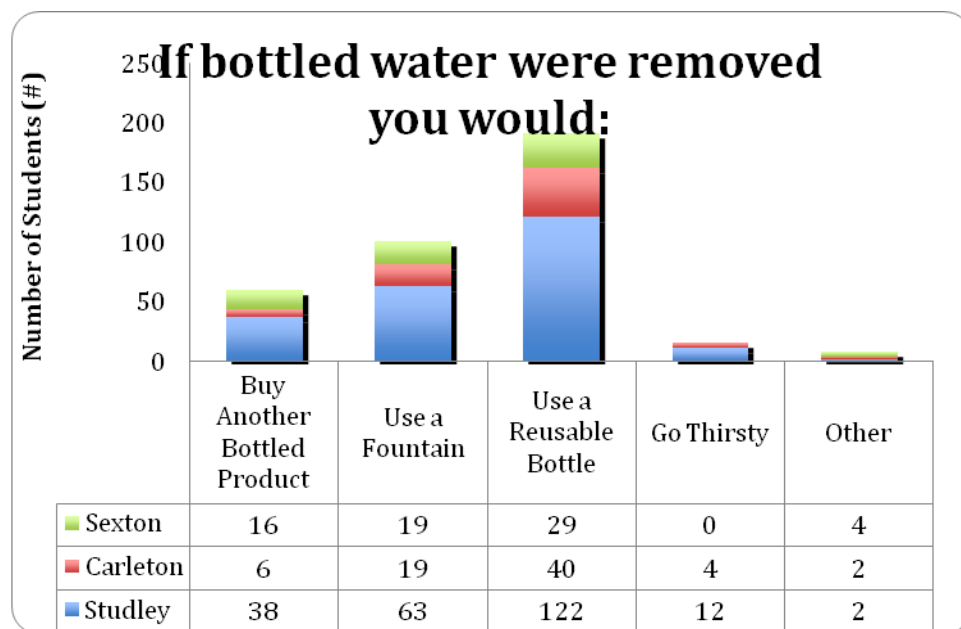
Figure 7A. – What students would do if bottled water were no longer sold on campus when thirsty. Broken down by campus

This trend remained across all campuses, with the option of buying another bottled product always ranking third behind using a reusable bottle and going to a water fountain (Figure 7B, C, D). It was also found that year of study did not have a significant affect on this decision, with a relatively equal proportion from each year contributing to each answer (Figure 7E).
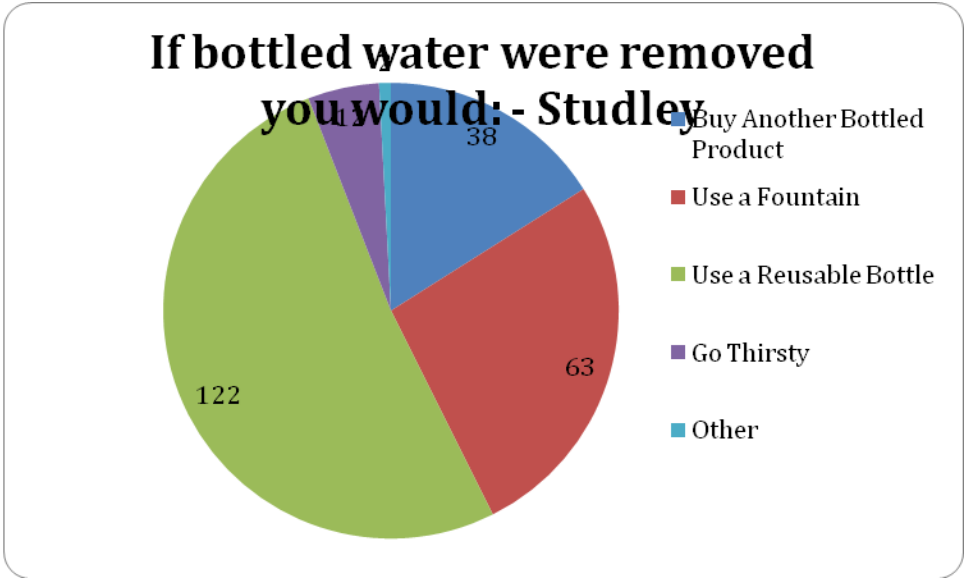
Figure 7B. - What students would do if bottled water were no longer sold on campus when thirsty on Studley campus
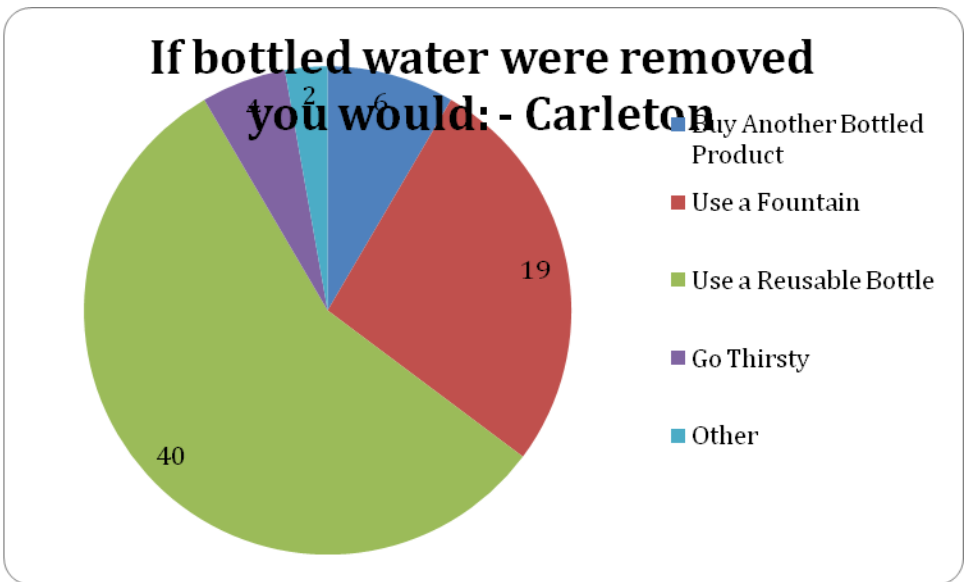
Figure 7C. - What students would do if bottled water were no longer sold on campus when thirsty on Carleton campus
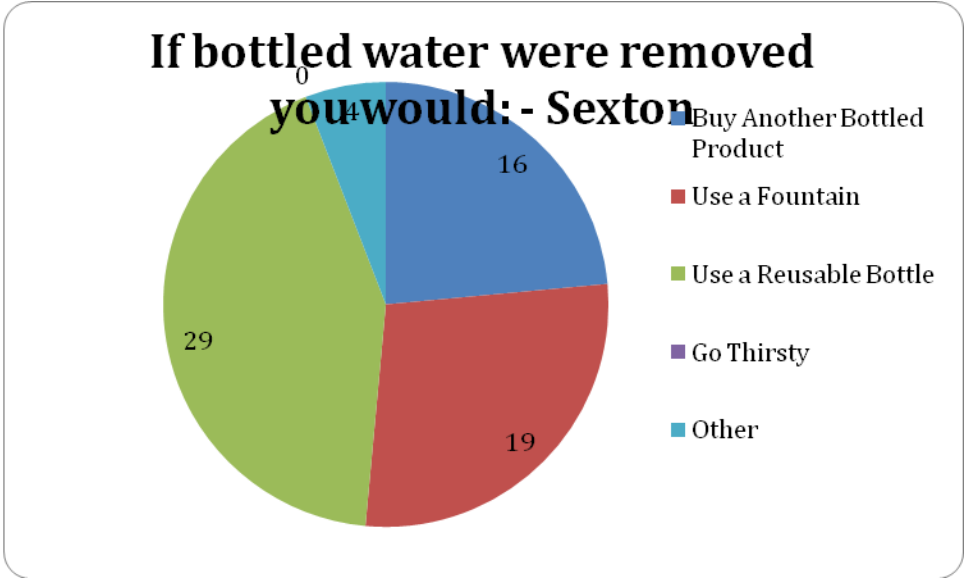
Figure 7D. - What students would do if bottled water were no longer sold on campus when thirsty on Sexton campus
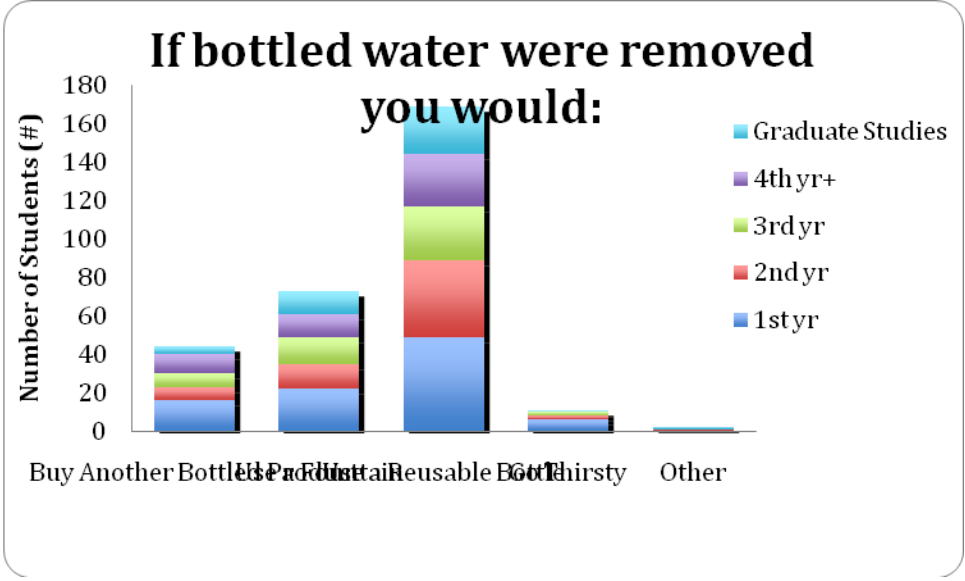
Figure 7E. - What students would do if bottled water were no longer sold on campus when thirsty, broken down by year.

3.5 Support for removal of bottled water on campus

Finally, the survey asked respondents if they supported the removal of bottled water from vending machines food service locations or both. It was found that support outweighed opposition in all three cases, removal from vending machines, removal from food service and removal from both (Figure 8A, B, C). Removal of bottled water from vending machines alone had the most student support, whereas removal from food service was less supported.
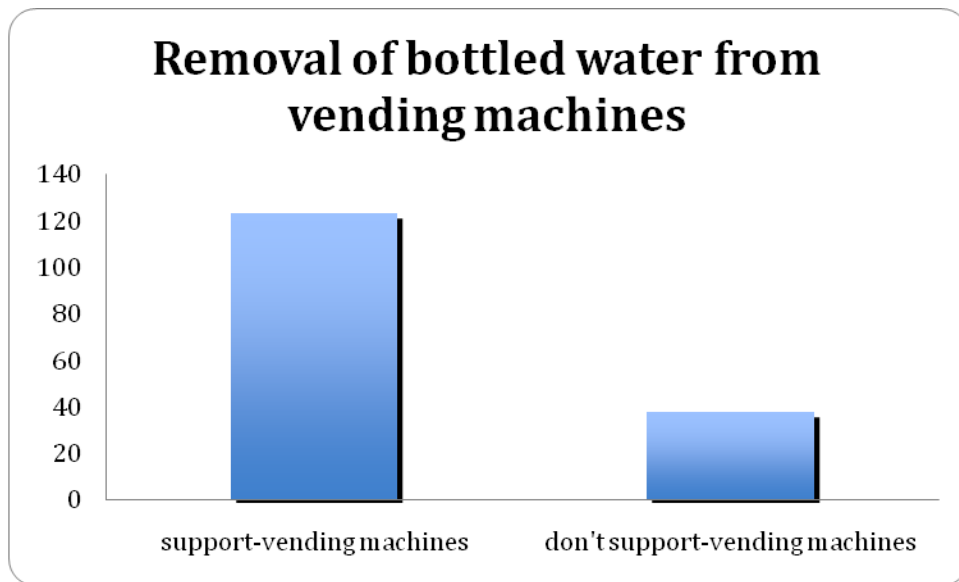
Figure 8A. – Student support for the removal of bottled water from vending machines on campus.
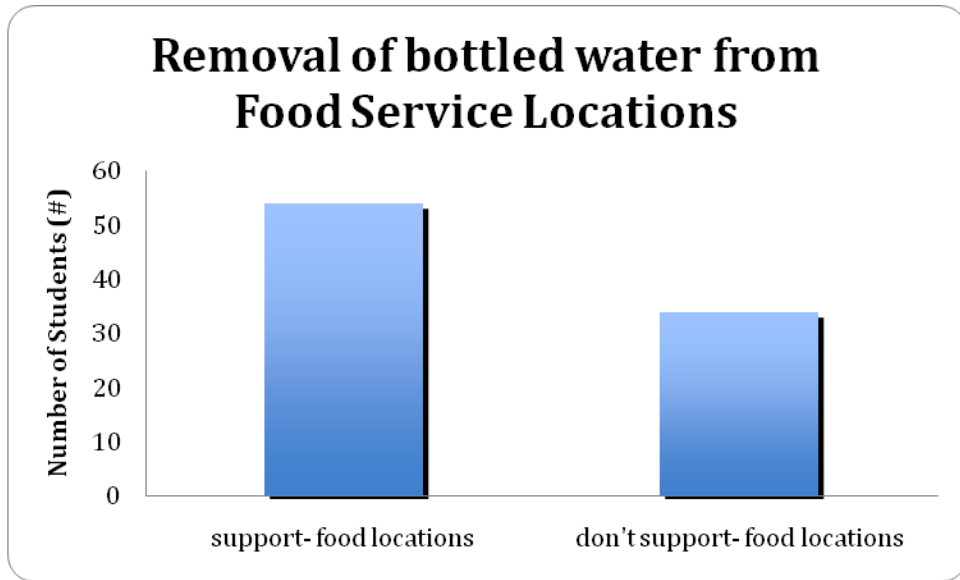
Figure 8B. – Student support for the removal of bottled water from food service locations on campus.
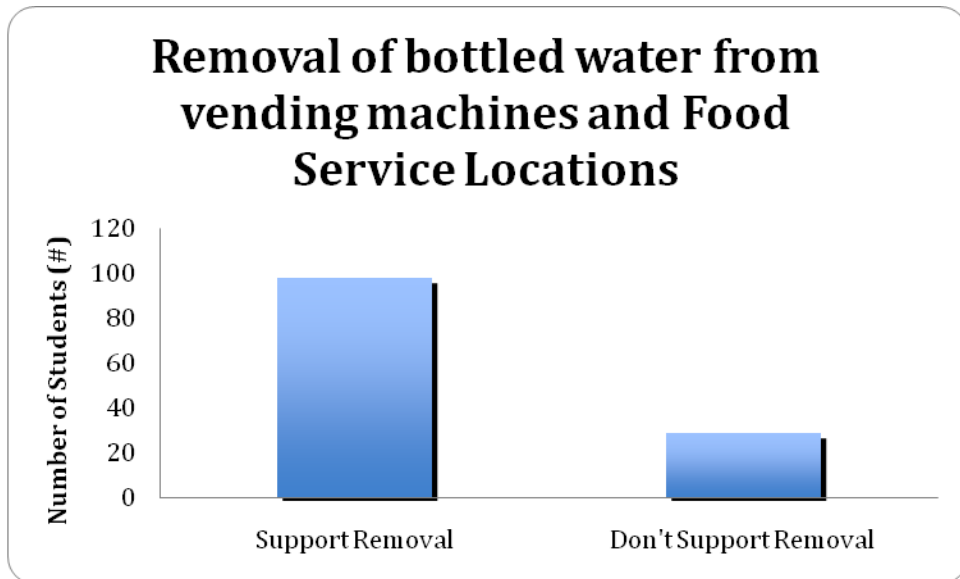
Figure 8C. – Student support for the removal of bottled water from both vending machines and food service locations on campus.

In order to get an overall idea of support for the removal of bottled water, all responses indicating support for removal from any or all locations were compared to

responses indicating opposition for removal from any or all locations (Figure 8D). This indicates that the majority of students are in favour of the proposed removal of bottled water in one location or both indicating that there is student support for, at the least, the reduction of bottled water sale on campus.
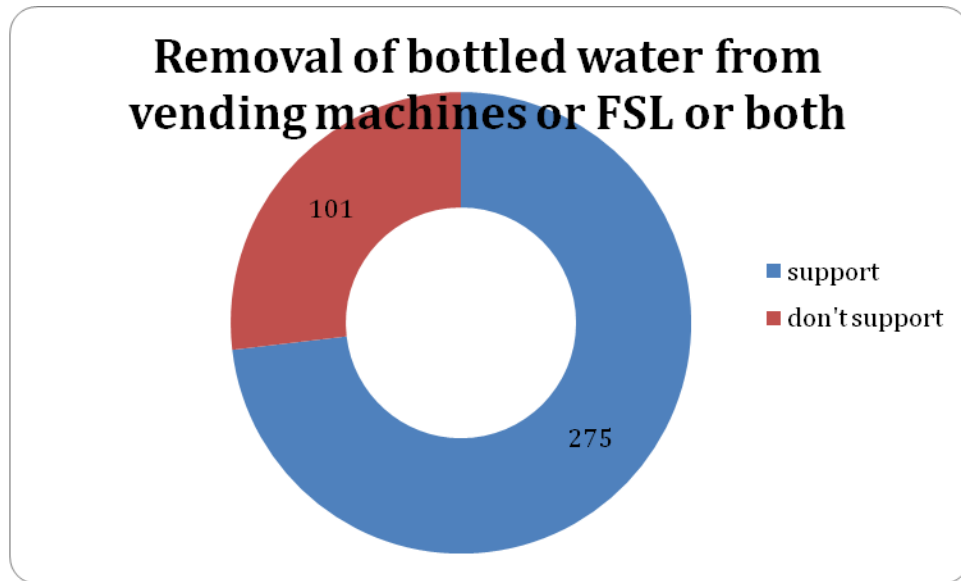
Figure 8D. – Overall student support for removal from any or all locations where it is sold on campus. "Support" totals all positive responses for removal from food service, vending machines or both where "don't support" totals all negative responses.

Overall, in analyzing the results it can be seen that a large proportion of the Dalhousie community already utilize reusable bottles and water fountains instead of buying bottled water. The main reasoning behind the purchasing of bottled water was shown to be convenience. A majority of students indicated that they would be more likely to use a water fountain at food service locations over buying bottled water, were a water fountain available. On a whole there appears to be student support for at least a reduction

of bottled water sale on campus by removal of bottled water from vending machines, food service locations or both.

4.0 Discussion

From completing and analyzing the surveys and their results we were able to reach our goals and objectives, and answer our research question: what is the level of student support for the removal of water bottles from vending machines and food service locations on all three of Dalhousie campuses?

4.1 Significant Findings

Our results were indicative of a positive trend toward generating student support for the removal of bottled water from campus food and vendor locations under a few conditions. Upon analyzing the results of the surveys it was clear that 61% of students on all campuses never purchase bottled water, and 32% of them only purchase it between one and three times a week. Collectively these values represent 93% of the student population polled on campus, from which we can infer that the market for water bottles on campus is not very large. After observing this, we polled students about their reasons for purchasing bottled water, to best assess what motivates students to buy water on campus if it is something they so rarely do. 39% of students on all campuses indicated that their motivation for purchasing bottled water is convenience, and 34% said they purchase bottled water because they do not know where the water fountains are. The group of 27% of students remaining was comprised of those who buy bottled water for taste reasons, or because they have health concerns associated with public water. Educating students with posters in central locations around campus about the excellent quality of public water in

the Halifax Regional Municipality would encourage the students in this rank to abandon their concerns associated with public water. Blind taste tests in central campus locations such as the Student Union Building are also a positive way of demonstrating how difficult it is to truly tell the difference between bottled water and water from campus fountains. Students who purchase bottled water for convenience reasons could be swayed to use reusable bottles if water fountain infrastructure was improved, and those who don't know where fountains are could easily be swayed if fountains were centralized and if maps indicating their location were placed around campus.

Another significant result from our analyzed survey data was the overall student support for the removal of bottled water on campus from food locations and vending machines. 33% of students polled indicated that they supported the removal of bottled water from vending machines, 14% indicated that they support the removal of bottled water from food service locations, and 26% indicated they support the removal of bottled water from both. Only 10% of students polled indicated that they do not support the removal of bottled water from vending machines, 9% do not support the removal of water bottles from food service locations, and 7% do not support the removal from either. Our results also indicated that if water fountains were located at service vendor locations on campus, 56% of students would make use of them, eliminating the need to purchase bottled water. Furthermore, if the option to purchase bottled water was removed, 51% of students polled would use a reusable bottle which indicates their willingness to alter their buying habits, and adapt to changes made on campus so long as infrastructure is improved.

4.2 Human Error

One of the problems with conducting research that is so heavily dependent on data analysis is the potential for human error. Our team established concise methods for coding the survey data, and remained vigilant about not straying from them. No matter how vigilant however, the potential for miscalculating or miscounting results remained high. For this reason only two of the group members coded and analyzed all the data to avoid calculating the same answers twice, and to avoid running into other obstacles that stem from having too many people evaluating something as critical as survey data. The possibility for human error was also evident in the way the surveys were filled out by intercepted students. One of the biggest problems our group came up against in this regard was students who only filled out one side of the survey because there was no explicit indicator that the sheet was double sided. For this reason more surveys had to be filled out because those that were only half completed were deemed void. This problem could have easily been avoided by writing "Please Turn Over" at the bottom of the first page of the survey.

4.3 Assumptions

When initially establishing our research question and methods, our team was extremely optimistic about what the results would be. As sustainability and environmental science students, our opinions about bottled water naturally reflected the biases of our respective programs. Our naïve assumption was that this sentiment would largely be shared by the entire Dalhousie student body. Upon administering surveys and analyzing the data however, it became incredibly clear that this was not so. Student apathy toward filling out the survey was high, especially in high traffic areas such as the Tupper Link. On several occasions students declined filling out the survey when they

learned what it was about, and others still failed to fill out both sides. This apathy is a major obstacle that will need to be overcome before overwhelming student support for the removal of bottled water can be established.

While many students were apathetic about the survey, many shared sentiments similar to ours in that they were supportive of a bottled-water ban on campus, however they were hesitant to part with their freedom of choice. Many students expressed a desire to be able to purchase bottled water should they forget their reusable bottle, and others expressed a fear that removing bottled water from campus would encourage students to consume the same amount of plastic, while ingesting less-healthy drinks. Many of these students articulated that they would part with the ability to purchase bottled water if water fountain infrastructure was improved and centralized. In several buildings on campus, including the Dunn and the Dentistry Building, water fountains are scarce and have poor flow and taste, which leaves students with few options beyond purchasing water bottles, or filling up a reusable one before entering the building.

4.4 Survey Reponses
Prior to conducting the surveys, our group decided to survey students on all three campuses in order to ensure that the results were not exclusive and reflected the opinions of the entire student body. We collectively decided intercept areas, such as the Student Union Building or libraries would be the best locations to survey as they are high-traffic areas and would allow us to survey the most amount of people in a short period of time. At a 95% confidence level with a +/- of 5 for an estimated population of 16,000, 376 surveys were needed to achieve representativeness. Our group was able to conduct the

376 surveys needed, but encountered some difficulties during the process, and as a result, had many more surveys from Studley than the Sexton or Carleton campus.

Firstly, the week we chose to survey was coincidently the medical students' reading week. Our group members had a difficult time finding students to survey on the Carleton campus, and had to re-locate to the Studley campus to complete the required amount of surveys. Another problem our group encountered was the approachability of students at the Sexton Campus. Although the students were not on break, our surveyors had trouble approaching students, who seemed rushed, uninterested and sometimes hostile. Although the group members stayed on the campus for about two hours, they too had to relocate to Studley campus to complete their surveys. The schedule conflict and student behaviour were factors that influenced the results of the survey, as most of the responses were from students on Studley campus. Although we did achieve the required amount of surveys, we learnt the importance of extensive research in order to determine the best times to conduct surveys and consideration of uncontrollable behavioural factors prior to surveying.

4.3 Findings in Light of Existing Research

The results for this study were compared to data collected from the 2009 Aramark study. It was found that there were many similarities, accompanied by some minor differences. When looking at how often people buy bottled water on campus, both studies showed that the majority of students do not purchase bottled on campus, and if they do, they do so infrequently. In the Aramark report, the majority of management students use a reusable water bottle because of the environmental implications associated with plastics (Carter et al, 2009). In this survey the majority of students made this decision because of

their economic benefits. Environmental implications of plastics were a close second to economic benefit. The reasons people buy bottled water were the same in both studies with convenience being the biggest factor in using bottled water. Both surveys found that if water bottles were removed from food service locations and vending machines, students were very likely to use water fountains or purchase a reusable bottle. Both surveys looked at how the placement of water fountains affects students' likelihood to use them. It was found that if fountains were better placed, or installed near food services locations, students were very likely to use them instead. By comparing these two surveys it becomes apparent that since the results from these two studies are similar, we can conclude that our results reflect how Dalhousie students feel about the banning of water bottles on campus.

The background research showed that universities both in Canada and around the world have already implemented water bottle bans or are in the process of doing so. As the findings show that students are in favour of the removal of bottled water and vending machines on campus, it is completely realistic for Dalhousie University to do the same. Other universities, such as Leeds have conducted surveys of their own, which have led to a referendum and the banning of bottled water on their campuses in cafés and shops (Wainwright, 2008). It seems as though student surveys are a key tool in persuading university to remove bottled water on campus.

4.4 Implications for Theory & Practice

This report could be used by other universities seeking to diagnose the level of student support on their campus for a bottled water ban. In general this report proved that students have environmental concerns associated with the sale and consumption of

bottled water, and that they would support the removal of bottled water from vending machine and food service locations if water fountain infrastructure was improved and centralized. The implications for practice in this regard involve improving student and faculty accessibility to water fountains, and spreading awareness about the high level of quality of HRM water. Furthermore, promoting this study within facilities management at Dalhousie is vital to improving water fountain infrastructure on campus. Educating students and faculty about bottled water at the beginning of the school year, and supplying first year students with a DAL reusable water bottle as part of their frosh orientation package would be another means of reducing water bottle sales, and promoting the support for a ban on campus.

5.0 Conclusion

5.1 Recommendations for Action
From analyzing the results of our surveys, it is evident that there is student support at Dalhousie University for the removal of water bottles from vending machines and food service locations on campus.

A significant result that was discovered from analyzing the survey data was about water fountain infrastructure on campus. From our results we concluded that students are willing to bring reusable water bottles to campus, but are unaware of water fountain locations and cannot refill their bottles once their initial water is finished. We discovered students are willing to support a ban, but cannot do so until water fountain infrastructure on all campuses is improved. In order to improve students' knowledge of water fountain locations, our group proposes the following actions;

- Install more water fountains, especially in the high-traffic areas of campuses and near food service locations to dissuade the purchase of water bottles.

- Upgrade current water fountains to improve cleanliness, water pressure and accessibility

- Increase student's knowledge of water fountain locations by creating campus maps that specifies their location

- Install water fountain signage in the buildings on campus

In order for a water bottle ban to be effective, water fountain infrastructure must be significantly improved so students have access to water sources. A water bottle ban will only be successful if there is a strong 'alternative', and little effort required from students. People base their actions around ease and convenience; this means that accessibility to water fountains needs to be significantly increased if there is to be compliance for a water bottle ban.

Another significant and expected result from the survey was student's unwillingness to lose the convenience of water bottles. We asked students what they were most likely to do if water bottles were removed, finding that the majority of students' would switch to reusable water bottles or water fountains. This is promising because removing bottled water would dissuade these students from using a plastic container, which is the largest environmental concern associated with this project.

A number of students would replace water with other drinks such as pop or juice. This finding is significant because it highlights the need to remove vending machines before a ban can be implemented. People will replace water with other plastic-bottled beverages, meaning the environmental issue of plastic bottles is not solved if people

continue to buy drinks from vending machines. This discovery is also a health issue because students will increasingly replace water with a less healthy alternative. Vending machines not only act as a barrier to a successful water ban, but as 'steps backwards'. The issue of water bottles will continue to be swept under the rug if vending machines are not banned. Bottled water may be banned, but the problem of plastic bottles will remain if other drinks are available for purchase in vending machines. Therefore, to strengthen the validity of a campus-wide water bottle ban, vending machines removed from campus to reduce the convenience of water bottles and provide no other plastic alternatives.

5.2 Recommendations for Future Research

Now that all the results were obtained regarding how students feel towards the removal of bottled on campus, a survey could be conducting focusing this time on how faculty, staff and food services providers feel about removing water bottles from vending machines and food service locations. It is important to gather insight about how other members on campus feel about a bottled water ban, not just students.

As some of our recommendations for action include installing more water fountains and fixing the existing ones, a feasibility report could be conducted which analyzes the economic constraints of retrofitting, removing, and installing water fountains on each of the Dalhousie campuses. On top of the feasibility study a survey could be conducted that just focuses on students' opinions about water fountains on campus. This would be useful because it would allow for in-depth analysis about why or why not people use water fountains on campus.

As explained in the discussion, one of the main concerns raised by the survey respondents was that there is a lack of water fountains on campus and they do not know

where they are locate. Since this the case, an additional project could involve the mapping of where water fountains are located on campus and brainstorming ways that this map would be available to the Dalhousie population.

Since we were unable to gather a large amount of surveys from Sexton and Carleton campus, another survey could be administered on each of these campuses again in order to yield more results from those campuses. The same survey could be used, but administered in a way that shows proportional representation for faculty, year of study and campus used so that more precise relationships between them can be determined.

If the removal of bottled water from vending machines and food service locations is approved, follow-up research could be conducted. This research would involve administering students again to see how opinions have changed regarding water consumption on campus, if people use the water fountains more, and if the student body is happy with the decision to ban bottled water on campus.

5.3 Final Remarks

In conclusion, from conducting and analyzing surveys regarding how students consume water on campus and their support for the removal of bottled water at Dalhousie, it is evident that Dalhousie students are in favour of removing bottled water from vending machines and food service locations on campus. However, there are certain concerns that need to be addressed before this ban can be put in place. Water fountain infrastructure needs to be improved by fixing and installing water fountains around campus. This report will hopefully help support SustainDal's plan to ban bottled water at Dalhousie.

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8.0Appendices

Appendix A- Research Proposal

Preliminary proposal 3502:

Diagnosis of the level of support for bottled water ban on Dalhousie campuses

28/02/2011

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Juan Hidalgo

Project Definition

Our project is an attempt to further diagnose the degree of student support on campus for the banning of bottled water. Bottled water is defined as water sold in single-use plastic bottles and banning is defined as the prohibition of sale on campus. Dalhousie has made the initial steps towards banning bottled water on campus; this report is intended to further the past work that has already been done by collecting data from a wider array of the students and then interpreting the data. The past student supported survey focused only on management students, and showed a significant degree of support for the ban of bottled water on campus in that faculty. As our group is trying to comprehensively understand the level of support for the banning of bottled water we will broaden the scope of the survey in an attempt to create a larger picture of student attitudes towards a bottled water ban on campus. In order to achieve opinion of the entire Dalhousie student body, surveys will be conducted on all three campuses in major academic buildings and at food service locations, areas where large numbers of diverse students congregate such as the Life Science Centre and the student union building.

Surveys will be performed using an intercept method and will focus on what water source students use most on campus, reasoning behind their choice and general opinion on removal of bottled water from campus. Results will help define the amount of support among students on all three campuses for banning the sale of bottled water. The results of the survey are aimed towards Dalhousie administrators in an effort convince them that a bottled water ban is something students support. One of the strengths of this survey and project is that it was constructed so that if there was negative feedback concerning the ban, the survey would help describe major barriers to a campus wide bottled water ban. Illustrating what needs to be done to change this perception on campus and come to a solution.

The survey that we would be building upon was performed in 2009, a feasibility study was conducted which involved the surveying of management students at Dalhousie and research on water bottle bans at other academic institutions and in municipalities. The surveys of management students came back with positive results, showing that 81% of students prefer to use reusable water bottles instead of purchasing single use bottles (Carter et al 2009). It also demonstrated that several of the largest barriers to a ban may not actually be barriers but simply a lack of implementation. Only 26% of students on campus actually rely on the purchase of bottled water for water consumption on campus and of these students 63% would switch to water fountains if bottled water were removed (Carter et al 2009). These observations support the prediction that students will be receptive to a ban on bottled water. Only 18% of students would buy a different single use plastic bottled beverage if water were not available, suggesting that without bottled water as an option, general purchasing of other single use plastic bottles would not drastically increase.

A potential campus-wide bottled water ban proposal has already been drawn up, it consists of four phases outlining how a ban should be implemented (DSUSO and sustain Dal water). These include:

1. Dalhousie must ensure that there is public access to safe water on campus, specifying that no old water fountains may be removed without replacement by a new fountain and that all new fountains must be wheelchair accessible.

2. No more Dalhousie funds may be spent on the purchasing of bottled water for sale on campus, all food service contracts must exclude bottled water

3. All contracted vendors on Dalhousie campuses are prohibited from selling bottled water on campus

4. Bottled water sale banned on all locations on campus, but Dalhousie must ensure that vendors have access to public water so as to meet demand for water

In our opinion it is worth investigating the amount of student support on campus for banning bottled water because Dalhousie administrators have a responsibility to sustainability and to their main clients, the students and their wishes. If the results demonstrate that students do support the removal of bottled water, it would help to justify, facilitateand ameliorate the process of implementation. A ban would be worthwhile as a way to significantly reduce the amount of both campus waste and support for polluting multinationals. The bottled water industry is an enormous polluter in both production and distribution of bottled water, it is estimated that 3L of water are required for every 1L of bottled water produced (Morningstar.) Of the millions and millions of water bottles produced it is estimated that only 5-15% of the bottles are actually recycled (Barlow). The plastic bottles that do not get recycled end up in landfills and the ocean resulting in dead zones such as the north pacific dead zone. With a ban on bottled water in place, Dalhousie would reduce its ecological footprint, setting an example as a leader in sustainability, both of which are goals of the Dalhousie sustainability policy (Dalhousie sustainability policy).

Background and Rationale of Project

The Sustain Dal office combined with the College of Sustainability and environment proposed a survey of Dalhousie students regarding banning bottled water from vending machines and food services (Carter, Cogswell& Dyer 2009). Dalhousie's College of Sustainability and the Environment, founded in 2009, is the first of its kind among Canadian Universities (Horrocks 2009). From within the college that the Sustainability and Society program was initiated, striving to introduce and implement initiatives which meet the standards of Dalhousie Sustainability policy. Therefore, one of the primary goals has been to ban the use and sale of bottled-water from vending machines and food services locations on campus (SustainDal water committee 2009). This initiative is being implemented in two phases: the first being infrastructure and maintenance improvements to existing public water locations, the second a restriction of Dalhousie funds to procure the sale of bottled water on campus. Dalhousie's commitment to banning bottled water on campus is part of a national effort lead by municipalities and universities across Canada (SustainDal water committee 2009).

A number of Canadian municipalities and universities have recently started to address issues surrounding the consumption of bottled water. Addressing their continuing environmental responsibilities, several municipalities and universities have banned the sale of bottled water on campuses and city premises (SustainDal water committee 2009). More than 17 municipalities from five provinces have banned the sale and distribution of bottled water on city premises while another 45 have indicated significant interest (Carter, Cogswell& Dyer 2009). Susbsequently it is not surprising that this ban is a Dalhousie priority.

Toronto:

In 2008, the city of Toronto eliminated the sale and distribution of bottled water on city premises. The city not only took the initiative to eliminate the product, but also made a commitment to ensure fundamental access to tap water in all city facilities. In doing so, Toronto became the largest city in the world to pass such extensive regulations eliminating the use of bottled water (Toronto Star 2008).

Nova Scotia:

The city of Halifax has implemented a ban on the sale and distribution of bottled water in all municipal buildings as of 2011 (Carter, Cogswell& Dyer 2009).

The municipality of Barrington made a decision last year to remove all bottled water in municipal facilities. This came primarily as the result of a broad-based coalition

of organizations in Nova Scotia who launched the "Campaign to Turn on the Tap and Ditch the Bottle." The municipality anticipates a savings of $100 per month and will serve as a model for other local governments (NovaNewsNow 2008).

Other Municipalities:

Other municipalities showing similar initiatives are: Edmonton AB; Burnaby BC; Nelson BC; Vancouver BC; St John's NL; Brockton ON; Blue Mountain ON; London ON; Owen Sounds ON; St. Catherine's ON; Waterloo Region ON; Charlottetown PEI; Toronto ON (Carter, Cogswell& Dyer 2009).

Universities:

A student referendum at the University of Leeds in December 2008 voted overwhelmingly to ban the sale of bottled water in the Student Union building, including its bars, cafes and shops. The motion was put forward by People and Planet, a student group aimed at raising awareness of environmental issues. Leeds is the first university in the UK to implement such an initiative (The Guardian 2008).

Concordia University and the University of Guelph have both worked over the past few years to implement water bottle "free zones" on their campuses (GSEC 2008). Guelph students belonging to the organization Tap-in worked alongside student union officials to create more than 12 bottled water "fee zones" since 2008. One of the biggest issues Guelph students face is mitigating students ability to "choose" where they get their water on campus; an issue that exist today at Dalhousie (GSEC 2008).

A working group called TAPTHIRST has been campaigning against the use of bottled water at Quebec's Concordia University since 2008. TAPTHIRST is part of a non-profit organization called Quebec Public Interest Research Group (QPIRG), a group which has been active in raising awareness and motivating grassroots activism around diverse social and environmental issues (Take back the Tap 2007). So far TAPTHIRST has only been able to enact 3 bottled water "free zones," facing many challenges in reworking a system which faces significant bureaucratic red tape (Take back the Tap 2007).

The Implications of Bottled Water

Dalhousie's commitment to banning the sale of bottled water encompasses addressing the economical, sociological, environmental and ethical concerns which are associated with bottled water (SustainDal 2009). Bottled water is a recentphenomenon which began in France in 1968 but did not gain popularity well into the late 1980's (Horrocks 2009). Canadian figures put bottled water at nearly 10% of the total beverage market share, competing heavily with soft drinks, wine and spirits (Carter, Cogswell& Dyer 2009). Despite these numbers there is growing dissent against the bottled water industry as communities and universities mentioned above continue to restrict the use of bottled water due to its many detrimental ramifications. Many of these groups consider bottled water to be a commodity and not a necessity (Horrocks 2009). Therefore, it does not make sound logical, economic or environmental sense to stroll past a free fountain or tap to purchase a bottled version which exhibits a mark-up of up to 10 000 times public water. This fact is exacerbated in light of the fact that Canada was ranked second only to Finland according to the United Nations rating of public water quality (Stevenson 2003). Furthermore, the environmental implications of bottled water are staggering; currently it takes 17.5 kg of water to produce 1kg of plastic bottles. Estimations also suggest that three litres of water are required for every one litre of water sold (Horrocks 2009). Therefore in consuming bottled water we are also consuming large levels of oil and water for no rational reason other than status and convenience and the latter can be solved by good management.

The political and social implications existing around the international bottled water industry have also become much more apparent in the last decade. Not all countries have access to, or can provide, cheap, safe, readily available public water. This reality has forced many global citizens to turn to bottled water for their source of clean water; paying a crippling amount for it (Polaris Institute 2007). Therefore, in a country which has access to cheap safe drinking water, it is illogical and nigh on immoral to support an industry which pollutes our planet and takes advantage of citizens who have no other choice.

The proposed survey is just another step towards gathering the data and support needed to fulfill our bottled water initiative and continue in our progression towards sustainability. Currently new public water fountains are being installed around campus, infrastructure and water quality is being tested, and contract negotiations are in motion. The campus-wide survey is just another piece of the puzzle needed to implement action which is gaining momentum across Canada and beyond.

Methods

By executing the following research methods, we hope to gain an understanding of the degree of student support for the removal of disposable water bottles at food service locations and vending machines on the Dalhousie campus. This section will describe the methods used in carrying out the research design and can be divided into two sections: literature analysis and data collection. For the literature analysis, the afore mentioned 2009 Aramark survey will be looked at, and compared to the data collected for this study. Qualitative methods, including intercept surveys and questionnaires will be used in order to gather data. Please refer to the schedule on page (insert pg number here) which outlines when and where the following methods will take place.

Limitations & Delimitations

The limitations, uncontrollable circumstances that may affect the result of the study or limit its scope, include: temporal limitations concerning data collection due to lack of individual time and short semester length, the willingness of students to participate in the survey and the truthfulness of the responses of those being surveyed (Palys&Atchinson, 2008, ch5). Delimitations, imposed conditions that restrict the scope of the study, include: variations in data accuracy due to sample size and sample location, as the amount of people surveyed will not be representative of the whole population of Dalhousie students and the selected survey locations might skew the data due to lack of random survey contestants. Any human error associated with analyzing the results can also devalue our data (Palys&Atchinson, 2008, ch5).

Step One: Aramark Survey Review

By analyzing the results from the previous study, completed by Aramark, we will be able to see which questions on their survey should be included in ours and which ones need to be reworked. The survey will also be used as comparison tool to the results obtained from this study. Since both will have been administered on the Dalhousie campus, we expect the results not be completely different, but some variability in results is to be expected due to the single location of their survey. The review of this study will take place before the survey being used in this project will be completed, this should allow us to make predictions and provide us with an idea of what to expect and how to make our survey. A copy of the Aramark study will be included in the appendix of the final report.

Step Two: Create the Survey

The second step is to create the survey. Some of the questions were paraphrased from the above discussed survey administered in 2009 by Aramark. Additional questions were added that our client, Gillian Pritchard, wanted to be included in the survey. The rest of the questions were added because the group deemed that they were important and were needed in order to gain valuable information and results pertaining to the research question at hand. The first four questions: "Are you a Dal student?" , "What is your sex?", "What faculty are you in?", and "What year of study are you in?", were used as determinants to establish if any correlations were present between age, sex, faculty, and year of study and the answers students provided on the survey. General questions in the survey are also important as we can highlight which groups of Dalhousie students think in a similar patterns and observe any correlations in between the sale of disposable water bottles and campus location. The final copy of the survey and the ethics form can be found in Appendix A and B respectively.

Step Three: Conducing the Survey

Once the survey is complete, each group member will pilot test the survey on one friend or roommate to ensure that it flows nicely, poses relevant questions, that it doesn't take too long to complete, and that there are no grammatical and/or spelling errors. A copy of the survey will also be sent to our client to ensure that she approves of the questions and format used. Once the pilot test is completed, the survey will be adjusted according to any necessary changes discovered via the pilot survey. The results obtained from the pilot test will not be included in the overall results and will only be used to improve the resulting survey. As mentioned earlier we will access students and their opinions in two different ways: intercept surveys in student hotspots and questionnaires given out in classes. The intercept surveys will be administered at food service locations and lounge areas on all three Dalhousie campuses, in the major academic buildings. On Sexton campus, surveys will take place in the "B" building at the food service location and in the Medjuck building in the main lobby area. Surveys at the Carleton camps will be administered in the Tupper link at the Tim Hortons, and in the Dentistry building lobby. On the Studley campus, we will be stationed at the Tim Hortons and Just Us in the Student Union Building, at the Tim Hortons / food court in the Life Science Centre and at the Second Cup in the Killam Library. The team will be split up into three groups of 2, each group surveying a different campus alleviating the pressures of researching individually.

The projected number of completed surveys is 300. It is evident that this will not be representative of the Dalhousie student population yet we hypothesise that this will be a large enough sample size to include a comprehensive sample. Instead of gathering a representative sample, we will be applying a sample strategy that is a mix of purposive and haphazard research methods. Our sampling is purposive because we are stationing ourselves near food service locations and in lounge areas because that is where we will be

the least invasive and where students will be more willing to fill out the survey allowing for efficient surveying. The sampling is also purposive because we are intentionally surveying on each of the three campuses trying to get a as random a sample as possible (Palys&Atchinson, 2008, ch4). By surveying on every campus, we will hopefully be able gather results from students belonging to each faculty. Our survey is haphazard because we are trying to survey as many people as possible by surveying whoever is willing to participate (Palys&Atchinson, 2008, ch4). By using these methods of controlled random sampling, valid data should be attained and if it is not then at least we will be able to hypothesis as to why. Collecting data showing a higher percentage of ban advocates in the Mona Campbell building (sustainability building) makes sense and we will take this phenomenon into account and perspective throughout our research interpretation. External validity, the ability to generalize the results to a larger population or in a different context, will be attained via testing of a random sample and extrapolation of that data to pertain to a larger population (Palys&Atchinson, 2008, ch2). If another researcher was to take our survey and administer it to a larger group of students at Dalhousie, the results would most likely be very similar, unless their methods contained some sort of bias. Reliability can be accomplished because the results will be obtained in same way by each group member using the same research protocol. Also one person will be responsible for imputing and coding the data in excel so that it is completed in a consistent manner. The surveyors must be conscious not to discriminate whom they survey as it could introduce bias results. Respondents will not keep their copy of the survey and surveys will be anonymous.

A preliminary survey session will be conducted, in which each group member will spend one hour surveying in their designated location. In this time, each member will get completed, as many surveys as they can. This will be useful in determining whether we set our goals too high or too low. The results obtained from this session will be used in the results. After preliminary information is gathered, we will continue to survey students until we reach the desired number of surveys.

The second data gathering method used will be to distribute the survey to classes in each faculty. This is done so that we can accumulate more results in a shorter period of time also giving the questionnaires to a varied and fair sample. Each member will take the survey to their classes and to classes in a variety of faculty buildings collecting data from a wide Dalhousie population. Permission will be gathered from the teaching instructor of the class prior to handing out the survey.

Step Four: Survey Analysis

Once all the data is collected and compiled, we will tabulate the results and enter them into Microsoft Excel. After tabulating the data into excel, we will be able to code the results. From coding, comparisons between faculty, age, or sex and the questions regarding the sale of disposable bottled water on campus will be exposed. We will then display the findings in graphs and tables, completed on Excel as well. This data will

show, to what degree, students support the removal of water bottles from vending machines and food service locations on the Dalhousie campus. We will then compare the results of our survey with the Aramark study. Any discrepancies or commonalities will be discussed. If there are large differences between the two studies, it is evident that there was a problem in implementing either of the two research strategies or some change in external variables (environmental or social) caused change. If they produce similar results, it confirms the fact that both of the surveys are useful and a good description of the student body's opinion. If our results show that students in certain faculties do not support the removal of water bottles on campus, efforts can be made to educate the students of the given faculty on the environmental implications of disposable plastic water bottles. If the results show that the majority of students that completed the survey are in favour of the removal of water bottles on campus, this project can move forward and be useful in Sustain Dal's attempt to ban bottled water on campus as a citable piece of objective research.

Homology and Heterogeneity

The aspect of the study that is homologous is that all of people being surveyed will be students of Dalhousie University we also expect to achieve homologous results to the Aramark survey. We will be using multiple heterogeneous features in the project: the faculty to which the student is a part of, their sex, and their year of study. Since we are looking at both homologous and heterogeneous characteristics of the sample, more detailed conclusions will be drawn (Payls&Atchinson, 2008, ch4).

Project Deliverables

The three products the group expects to produce and deliver as part of the sustainDAL water bottle project include a survey, a final report and a PechaKucha presentation. The survey has been widely discussed and will act a s a mechanism to extract data from the university community upon this subject. The cumulative report will showcase all aspects of the project and the group's findings. The report will include an introduction , background and context to the project, a description of our methods, an analysis of our results, a discussion, and a conclusion. It will combine all work and research throughout the semester to determine the feasibility of water bottle removal from vending machines and food service locations on campus and the census of the student body on this subject. Lastly, the PechaKucha presentation will be a short yet informative exhibition of our group project, and our findings, to our classmates. We will present the problem and findings to the class, yet the specificity of the presentation's structure is currently undetermined.

Communication Plan

Our group will communicate the outcome of the project to our client via email and several meetings. Throughout the semester, we will continue to meet and email Gillian to ensure she is aware of our progress and general direction of the project. We plan to hold a final meeting at the end of the semester, in which Gillian will receive a copy of our final report. We will discuss our findings extensively and will share our survey results in full detail in order to establish the level of support for water bottle removal. As our client Gillian has volunteered some direction as to how the project should be conducted and she has given us some helpful pointers such as some specific survey questions. This communication will allow us to produce a product that our client will be satisfied with .We have already had a successful meeting with Gillian and we were in accordance of the scope and direction of the project.

Project Schedule

Schedule of Project Events	February				March					April			Group Member(s) Responsible
Work Activities	1	8	12	22	1	8	15	22	26	1	5	13	
Meet With Client, Gillian	■				■		■			■			All
Meet With Mentor, John	■	■			■	■		■					All
Research Questions and Objectives Established		■											All
Background and Rationale			■										Malcolm
Project Deliverables			■										Will
Research Methods		■											All

Task	1	2	3	4	5	6	7	8	9	10	11	12	13	Responsible
Established	■													
Survey Complete		■												All, Sarah Formats
Final Project Proposal Submitted to Professors and Client			■											Juan
Funding Proposal Submitted				■										Marni
Survey Administered on Studley, Sexton and Carelton Campuses (All Week)				■										All
Data Analysis (Coding/Data Display)						■								Marni and Cat
Report Conclusions								■						All
Pecha Kucha Presentation												■		Juan & Sarah
Final Project Report Submitted													■	All

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Appendix B-Ethics Proposal

ENVIRONMENTAL SCIENCE PROGRAM
FACULTY OF SCIENCE
DALHOUSIE UNIVERSITY

APPLICATION FOR ETHICS REVIEW OF RESEARCH INVOLVING HUMAN PARTICIPANTS
UNDERGRADUATE THESES AND IN NON-THESIS COURSE PROJECTS

GENERAL INFORMATION

1. **Title of Project:** Studen Survey regarding the removal of bottled water on campus.

2. **Faculty Supervisor(s)** — Department — Ext: — e-mail:
   Tarah Wright — Env. Sci. — — tarah.wright@dal.ca

3. **Student Investigator(s)** — Department — e-mail: — Local Telephone Number:

   Marni Sandell — Env. Sci. — marni.sandell@dal.ca — (902)476-4933
   Cat Powell — Env. Sci — cat.powell@gmail.com
   Will Kietzman — Biology — WIS02420@dal.ca
   Malcolm Abercrombie — SUST — mqabercrombie@gmail.com
   Sarah Cranston — SUST — sr437306@dal.ca
   Juan Hidalgo — SUST — jnz41840@dal.ca

4. **Level of Project:**
   Non-thesis Course Project [X]
   Undergraduate [ ]
   Graduate [ ]

   Specify course and number: ENVS 3502

5. a. Indicate the anticipated commencement date for this project: January 25th, 2011

   b. Indicate the anticipated completion date for this project: April 13th, 2011

SUMMARY OF PROPOSED RESEARCH

1. **Purpose and Rationale for Proposed Research**
   Briefly describe the purpose (objectives) and rationale of the proposed project and include any hypothesis(es)/research questions to be investigated.

   The purpose of this study is to determine the degree of student support at Dalhousie University on the banning of bottled water on campus. The term "banning" will refer to the removal of one time use plastic water bottles from food service locations and vending machines

   Research Question:
   To what degree do students support the removal of water bottles from food service locations and vending machines on campus?
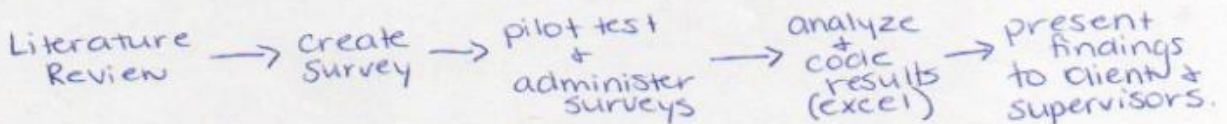   Rationale: To help SustainDal - in their attempt to ban bottled water on campus.

2. **Methodology/Procedures**

   a. **Which of the following procedures will be used? Provide a copy of all materials to be used in this study..**

   [ ] Survey(s) or questionnaire(s) (mail-back)
   [X] Survey(s) or questionnaire(s) (in person)
   [ ] Computer-administered task(s) or survey(s)]
   [ ] Interview(s) (in person)
   [ ] Interview(s) (by telephone)
   [ ] Focus group(s)
   [ ] Audio taping
   [ ] Videotaping
   [ ] Analysis of secondary data (no involvement with human participants)
   [ ] Unobtrusive observations

   [ ] Other, specify _____

   b. **Provide a brief, sequential description of the procedures to be used in this study. For studies involving multiple procedures or sessions, the use of a flow chart is recommended.**

   Literature Review → Create Survey → pilot test & administer surveys → analyze & code results (excel) → present findings to client & supervisors.

3. **Participants Involved in the Study**

a. *Indicate who will be recruited as potential participants in this study.*

   Dalhousie Participants: [×] Undergraduate students
                             [×] Graduate students
                             [   ] Faculty and/or staff

   Non-Dal Participants: [   ] Adolescents
                             [   ] Adults
                             [   ] Seniors
                             [   ] Vulnerable population* (e.g. Nursing Homes, Correctional Facilities)

* Applicant will be required to submit ethics application to appropriate Dalhousie Research Ethics Board

b. Describe the potential participants in this study including group affiliation, gender, age range and any other special characteristics. If only one gender is to be recruited, provide a justification for this.

   Students, both undergraduate and graduate, will be surveyed.
   Both male and female students will be include.
   The typical age range will be from 18-25, with some exceptions,
   such as mature students.

c. How many participants are expected to be involved in this study? __300 students__
   (approx.)

4. **Recruitment Process and Study Location**

a. *From what source(s) will the potential participants be recruited?*

   [×] Dalhousie University undergraduate and/or graduate classes
   [×] Other Dalhousie sources (specify) _food service locations & student lounges._
   [   ] Local School Boards*
   [   ] Halifax Community
   [   ] Agencies
   [   ] Businesses, Industries, Professions
   [   ] Health care settings*
   [   ] Other, specify (e.g. mailing lists) _____

* Applicant may also require ethics approval from relevant authority, e.g. school board, hospital administration, etc.

b. Identify who will recruit potential participants and describe the recruitment process.
   Provide a copy of any materials to be used for recruitment (e.g. posters(s), flyers, advertisement(s), letter(s), telephone and other verbal scripts).

   All the group members will be administering surveys.
   We will approach a student and ask for five minutes
   of their time to complete a survey about their use of
   water bottles and where they access their drinking
   water from on campus.

5. **Compensation of Participants**

   Will participants receive compensation (financial or otherwise) for participation? Yes [ ] No [X]
   If **Yes**, provide details:

6. **Feedback to Participants**

   Briefly describe the plans for provision of feedback and attach a copy of the feedback letter to be used.
   Wherever possible, written feedback should be provided to study participants including a statement of
   appreciation, details about the purpose and predictions of the study, contact information for the researchers,
   and the ethics review and clearance statement.

   Note: When available, a copy of an executive summary of the study outcomes also should be provided to
   participants.

   Since we are surveying people anonymously, we will
   not be able to send the results directly to them. We will
   verbally thank them for participating in the survey and
   inform them that a copy of the final report will
   be available on the environmental science website
   after the semester is over.

   If they express interest in the project, we will provide
   them with our email addresses so they can contact
   us for information.

POTENTIAL BENEFITS FROM THE STUDY

1. Identify and describe any known or anticipated direct benefits to the participants from their involvement in the project.

   The only direct benefit to the participant would be that they know they have helped someone with their study and that their opinions could lead to change.

2. Identify and describe any known or anticipated benefits to society from this study.

   Increased environmental awareness.
   By removing plastic water bottles from the two locations we will be decreasing our negative affect on the environment, benefiting society as a whole.

POTENTIAL RISKS TO PARTICIPANTS FROM THE STUDY

1. For each procedure used in this study, provide a description of any known or anticipated risks/stressors to the participants. Consider physiological, psychological, emotional, social, economic, legal, etc. risks/stressors and burdens

   [ ] No known or anticipated risks
   Explain why no risks are anticipated:

   [X] Minimal risk *
   Description of risks: *— any stress brought on by being asked questions.*
   — other risks of daily life.

   [ ] Greater than minimal risk**
   Description of risks:

   *   *This is the level of risk associated with everyday life*
   **   *This level of risk will require ethics review by appropriate Dalhousie Research Ethics Board*

2. Describe the procedures or safeguards in place to protect the physical and psychological health of the participants in light of the risks/stresses identified in Question 1.

   — letting the participant know that they can quit the survey at anytime.

   — the questions are fairly easy to answer and are not deeply personal. (eg. do not ask about income etc)

   — informing participants that it is confidential.

INFORMED CONSENT PROCESS

Refer to: http://pre.ethics.gc.ca/english/policystatement/section2.cfm

1. **What process will be used to inform the potential participants about the study details and to obtain their consent for participation?**

   [ ] Information letter with written consent form; provide a copy
   [ ] Information letter with verbal consent; provide a copy
   [ ] Information/cover letter; provide a copy
   [x] Other (specify) _Description of survey found on the survey_
   verbal consent from participants

2. **If written consent cannot be obtained from the potential participants, provide a justification.**

   - In attempt to make the survey as confidential as possible, we will not be asking for a written signature.
   - Name will not be asked for on the survey itself.

ANONYMITY OF PARTICIPANTS AND CONFIDENTIALITY OF DATA

1. **Explain the procedures to be used to ensure anonymity of participants and confidentiality of data both during the research and in the release of the findings.**

   - No name _____ required on the survey
   - The administer will not ask for their name/email

2. **Describe the procedures for securing written records, questionnaires, video/audio tapes and electronic data, etc.**

   - Written records will be kept in a binder with one team member.
   - electronic data will be on a usb device that will belong to one of the team members.

3. **Indicate how long the data will be securely stored as well as the storage location over the duration of the study. Also indicate the method to be used for final disposition of the data.**

   [X] Paper Records
       [ ] Confidential shredding after _____
       [x] Data will be retained until completion of specific course.

   [ ] Audio/Video Recordings
       [ ] Erasing of audio/video tapes after _____
       [ ] Data will be retained until completion of specific course.

   [X] Electronic Data
       [ ] Erasing of electronic data after _____
       [x] Data will be retained until completion of specific course.

   [ ] Other _____
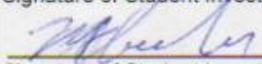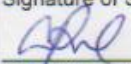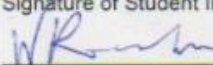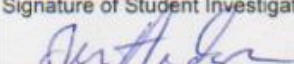   (Provide details on type, retention period and final disposition, if applicable)
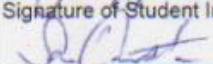
   Specify storage location: _paper data: In a folder with team members._
   electronic data will be displayed in a report online. (results of survey, not each completed form)

ATTACHMENTS

Please **check** below all appendices that are attached as part of your application package:

[   ] **Recruitment Materials**: A copy of any poster(s), flyer(s), advertisement(s), letter(s), telephone or other verbal script(s) used to recruit/gain access to participants.

[   ] **Information Letter and Consent Form(s)**. Used in studies involving interaction with participants (e.g. interviews, testing, etc.)

[X] **Information/Cover Letter(s)**. Used in studies involving surveys or questionnaires.

[x] **Materials**: A copy of all survey(s), questionnaire(s), interview questions, interview themes/sample questions for open-ended interviews, focus group questions, or any standardized tests used to collect data.

SIGNATURES OF RESEARCHERS

Signature of Student Investigator(s) _____   Date   Feb 17th, 2011

Signature of Student Investigator(s) _____   Date   Feb 17/2011.

Signature of Student Investigator(s) _____   Date   Feb 17/2011

Signature of Student Investigator(s) _____   Date   Feb 17/2011.

Signature of Student Investigator(s) _____   Date   Feb 17/2011.

Signature of Student Investigator(s) _____   Date   Feb 17/2011.

Signature of Student Investigator(s) _____   Date

FOR ENVIRONMENTAL SCIENCE PROGRAM USE ONLY:

Ethics proposal been checked for eligibility according to the Tri-Council Policy Statement: Ethical Conduct for Research Involving Humans

_____   _____
Signature   Date

_____   _____
Signature   Date

This survey is being performed by students in the ENVS/SUST 3502 class to help establish if Dalhousie students are in favour of a campus-wide ban on bottled water. Please circle that answers that most pertain to your personal experience or opinion about bottled water on campus.

1. Are you a DAL student?   **Yes/ No** 2. On what campus do you spend most of your time? _____

3. What Faculty are you in? _____

4. What year of study are you in? _____

5. How often do you use the following for water consumption on campus?

    a)   Refillable water bottle:

Always   **Almost Always**   **Often**   **Not Very Often**   **Never**

    b) Water fountains:

Always   **Almost Always**   **Often**   **Not Very Often**   **Never**

    c) Purchased bottled water:

Always   **Almost Always**   **Often**   **Not Very Often**   **Never**

Other _____

6. How often do you purchase bottled water a week?

Never   1-3   4-6   7-9   10+

7. If you purchase bottled water on campus, what is your motivation?

Taste

Convenience

Health concerns with public water

Don't know where water fountains are

N/A

Other: _____

8. If there were water fountains at food service locations on campus, how likely would you be to use them instead of buying bottled water?

Very likely   Somewhat likely   Somewhat unlikely   Unlikely

9. If you use a reusable water bottle, what is your motivation?

Cheaper

Health concerns associated with plastics

N/A

Environmental concerns, Please Specify _____

Other _____

Please explain your answer:
_____
_____
_____

10. If bottled water were removed from vending machines and food service locations at Dalhousie would you be more likely to:

Buy another bottle product instead (ie. juice or soft drink)

Use a fountain

Use a reusable bottle

Go thirsty

Other: _____

11. Would you support the removal of bottled water from vending machines and food service locations at Dalhousie? (You may select more than one answer)

I support the removal of bottled water from vending machines
I support the removal of bottled water from food services
I do not support the removal of bottled water from vending machines
I do not support the removal of bottled water from food services

12. If you answered "I do not support" the removal of bottled water from food services or vending machines" please explain your answer here:
_____
_____
_____

Thank you for taking the time to participate in our survey! Have a great day!

Appendix D- Aramark Water Bottle Study

Questions asked in the Aramark Study were as follows:

1. For your personal water consumption, do you:

Purchase bottled water on campus

Use a reusable water bottle

N/A

2. If you purchase bottled water, how often do you purchase it?

1-5 times per week

5-10 times per week

11-15 times per week

N/A

3. If you use a reusable water bottle, what is your motivation for doing so?

Long-term cost benefits

Concerns about environmental impact

Health concerns associated with plastics

N/A

Other:_____

4. If you do not use a reusable water bottle, what are you reasons for not doing so?

Initial cost of reusable water bottle too high

Inconvenience

Availability and convenience of bottled water

Sanitation concerns about public fountains

N/A

Other:_____

5. How would you rate the taste quality of Halifax's drinking water?

Excellent

Good

Acceptable

Poor

Terrible

6. If water bottles were removed from campus vending machines, would you be more likely to:

Buy another bottled product

Go thirsty

Other:_____

7. How would you rate the placement of water fountains on the Dalhousie campus?

Extremely well placed

Fairly well placed

Poorly placed

There are water fountains on campus?

8. Would better placement of water fountains increase your likelihood of using a reusable water bottle?

Yes No N/A

9. Would the availability of water fountains equipped with a separate spout designed specifically for filling bottles increase your likelihood of using a reusable water bottle?

Yes No N/A

10. Would you be more inclined to use a reusable water bottle if you received a student discount on bottles from the bookstore or if given one as part of your orientation package?

Yes No N/A

Appendix E- Raw Data