

# The Introduction of the Campus Conservation Partnership and Paper Reduction Campaign

By:

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## **EXECUTIVE SUMMARY**

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Royal Roads University (RRU) is an institution that upholds on-campus sustainability initiatives and environmental awareness for all campus members. Coastal Marketing Strategies (CMS) was contracted to achieve three main goals. The first goal was to create RRU's first "Green Team," named the Campus Conservation Partnership (CCP). The second goal was to create a prioritized list of initiatives that would reduce the university's carbon emissions. The final goal was to reduce RRU's carbon footprint by implementing Community Based Social Marketing (CBSM) strategies on the staff and faculty's printing behaviours. This report details the methods, results and recommendations of achieving these three goals.

Based on models from other universities and previous RRU efforts, CMS has developed guidelines for the future presence of the CCP. These guidelines included event framework, vision statement, operational goals, recruitment, and membership. CMS developed the CCP so that they can motivate students and faculty alike to create a stronger campus culture and raise environmental awareness.

A prioritized list of initiatives aimed towards the reduction of carbon emissions has also been developed to meet RRU's GHG reduction objectives. The list focused on reducing RRU's GHG emissions by changes in scheduling, infrastructure upgrades, modifying paper-based processes, behaviour adjustments, and community involvement. This provided the CCP with the foundation to take action and create positive changes for RRU.

By implementing CBSM strategies towards reducing carbon emissions at RRU, CMS aimed to change staff and faculty's printing habits by using the available printing paper baseline data. This included running a quantitative analysis to determine the overall impact that the chosen CBSM strategies had on printing paper use. The foundation of the campaign was to identify the benefits and barriers of reducing paper usage through focus groups and surveys.

The printing data shows that since 2011, RRU has decreased the overall amount of printing on campus. Printer 5278 was found to be the most used printer on campus over the past two years, averaging 82 sides per hour based on a 2080 hour work year. It is recommended that this printer be located and the reason for its high level of use be remediated. The top three print accounts represent over 10% of the total printing on campus. We recommend that these people be contacted directly to discuss special accommodations that could be made to reduce their printing. Through personal communication

individuals expressed a sincere conscious effort in sustainability initiatives; therefore, to see a significant change in printing totals, similar to the drop in 2012, a major shift to electronic systems is required.



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# **1 INTRODUCTION**

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## **1.1 BACKGROUND ON PROJECT**

Royal Roads University (RRU) is an institution that upholds on-campus sustainability initiatives and environmental awareness of all campus members. In November of 2013, Nancy Wilkin from the Office of Sustainability contracted Coastal Marketing Strategies (CMS) to create RRU's first "Green Team", and to create a prioritized list of initiatives that would reduce the university's carbon emissions. CMS worked towards creating the university's own long-term, student-run environmental group, the Campus Conservation Partnership (CCP). The CMS team was also responsible for decreasing RRU's carbon footprint by implementing Community Based Social Marketing (CBSM) strategies. This report details the methodology behind the creation of the CCP, along with the analysis of the CBSM strategies implemented throughout the nine month contract.

### **1.1.1 Sponsor**

Nancy Wilkin, Director of the Office of Sustainability, has graciously sponsored our research project. She sits on the board for the Nature Conservancy of Canada, and actively participates in sustainability projects within the Colwood Municipality. She is involved in reducing the university's greenhouse gas emissions, and is keen on seeing a green team with a sense of pride. Due to the changeover of students every year, she has envisioned a green team that will promote sustainability within the school and ensure the green team's presence on a yearly basis.

### **1.1.2 Scope**

The scope of CMS's project was to learn and practice CBSM strategies, to develop a methodology and report on its effectiveness. CMS presented baseline data, compiled results and were able to provide recommendations based on the barriers and benefits uncovered by CBSM strategies. CMS has also reported on their experience and effectiveness of creating the CCP. The formation of the CCP involved establishing a framework that would promise continual presence of the group on campus for years to come. CMS has also assembled a prioritized list for possible sustainability and energy reduction initiatives. Reporting these ideas to the Office of Sustainability, followed by its implementation, will help reduce RRU's carbon footprint.

### **1.1.3 Research Questions**

Three questions were developed in order to achieve our research mandate and maintain a focused effort throughout the project.

1. How effective was creation of the Campus Conservation Partnership (CCP) including its objectives, template, benefits, and future partner performance?
2. What are the prioritized sustainability initiatives that can be implemented at RRU through the Campus Conservation Partnership?
3. Using baseline data, how can we modify faculty and staff behaviour to see a significant reduction in paper use over time

## **1.2 CCP**

CMS developed guidelines for the future presence of the CCP on campus, along with membership and event framework, vision statement, and goals. CMS developed monthly environmentally themed events and projects that RRU and the CCP can promote together. The aim of these events was to motivate students and faculty alike, creating a stronger campus culture, raising environmental awareness and fostering participation in greenhouse gas (GHG) emissions reduction initiatives.

RRU created the Campus Green Program in 2008, with the aim of promoting environmental awareness on campus. Unfortunately, this program was unsuccessful due to the weak continuity from year to year. The CCP's creation was based on the framework set out by the RRU Campus Green program, along with other successful environmental group models from other leading universities. Monthly environmental awareness themes were created in alignment with other provincial, national and global sustainability events. Furthermore, a prioritized list of initiatives aimed towards the reduction of carbon emissions, has been developed to meet RRU's GHG reduction objectives. This provided the CCP the opportunity to take action and create positive changes for RRU. The list focuses on reducing RRU's GHG emissions by changing scheduling, making infrastructural upgrades, modifying paper-based processes (digital conversion), fostering behaviour adjustments, and promoting community involvement.

## **1.3 CBSM**

Community based social marketing is a method created by Doug McKenzie-Mohr which incorporates marketing strategies to change individuals' negative behaviours and habits. We tailored this method to reduce our printing paper use by using CBSM tools such as commitment, social norms,

prompts, communication, and social diffusion. These strategies are proven effective in overcoming individuals' lack of motivation, social pressure, and knowledge along with their forgetfulness to act.

RRU takes pride in making responsible choices when it comes to the paper that they purchase for on-campus printing. The paper used for administrative purposes is Forest Stewardship Council certified paper manufactured with wind power and containing 80% post-consumer recycled content (RRU Sustainability Plan, 2008). Diplomas and degrees are printed on cotton containing 100% recycled content. General on-campus printing from the computer labs and offices is done on paper containing 30% post-consumer recycled content (RRU Sustainability Plan, 2008). In addition, the printers used on campus are ENERGY STAR certified and the ink comes from soy-based toners (RRU Sustainability Plan, 2008).

Our main objective was to target faculty and staff's printing habits by implementing CBSM strategies to decrease greenhouse gas emission. By analyzing printing data from the past four years, it was possible to identify different time frames at which printing reached a maximum throughout the entire school. Analyzing printing data revealed the average print usage for individuals; this allowed the identification of staff and faculty whose printing records exceed the average. These individuals were our primary targets for our CBSM strategy implementations. We determined the level of success of our chosen strategies by monitoring printing data after implementation. A successful CBSM campaign would show a declining trend in printing.

## **1.4 ENERGY**

Under the BC Greenhouse Gas Emission Act universities must reduce their emissions by 33% by 2020 (N. Wilkin, personal communication, January 2014). In order to meet these requirements, RRU has identified the four main sources of GHG emissions on campus, including, energy consumption in the form of electricity and heat. We were tasked with providing a prioritized list for emissions reduction on campus.

Currently at RRU, there is no readily available data regarding energy use, for either heating or electricity, for any of the buildings on campus other than the Learning and Innovation Centre (LIC). Having been constructed recently, the LIC is the most energy efficient building on campus. It has its own variable frequency drives (VFDs) and direct digital control (DDC) system allowing the staff to control the building's energy use and consumption (F. Havekotte, personal communication, February 2014). In order to obtain heating data for each building, staff was requested to manually monitor and record energy consumption for all individual buildings on a daily basis.

## **1.5 LITERATURE REVIEW**

A number of education institutions are moving towards changing their paper consumption habits through sustainability and behavioural initiatives. Initiatives at other institutions are similar to what RRU is working towards for paper use reduction and CCP objectives. The following is a summary of these institutions' paper reduction and sustainability campaigns.

### **1.5.1 Camosun College (Victoria, BC)**

Camosun College switched from 30% recycled content paper to 100% in 2006, claiming that it saves over 1,000 trees per year, and reduces their carbon footprint by 44 tonnes per year. They also send out semi-annual reviews of student, faculty and staff printing, excluding the print shop. This is similar to the paper reduction and behavioural changes we are attempting to implement at RRU. Other sustainability successes and current initiatives at Camosun College include:

- Promoting Earth Hour and Earth Day; giving suggestions to staff and encouraging to habit changes on all days of the year,
- Having a Sustainability Day hosted by Camosun Students for Environmental Awareness (CSEA) and the Camosun College Student Society (CCSS): Networking with other students, staff, not-for-profits, and community groups,
- Using environmentally friendly paints and adhesives with low odour, which are not stored on campus; oil based products are only used when absolutely necessary,
- Requiring that all parking lots have catch basins that stop oils and fluid leaks from entering storm drains,
- Repairing furniture and equipment, by fixing, restoring, and reupholstering when possible in order to divert waste from the landfill. Unrepairable items were disposed of through recycling or other green waste streams, and
- All incandescent light bulbs have been replaced with low energy compact fluorescent lights, allowing for time schedule control by the evening security guards and custodians who turn off lights when appropriate. (Camosun College, 2014)

### **1.5.2 University of Victoria (Victoria, BC)**

University of Victoria (UVic) is in the process of switching to more efficient and environmentally friendly printers and copiers that use 100% recycled paper stock. This reduces the likelihood of printer jams, as the printer is designed to be fed with that specific quality paper. UVic has a number of featured



events that include, but are not limited to, solar power for your home and business, CAN BIKE 2 Cycling Skills course, Changing Gears – sustainability transportation expo, WaterFillz stations, and Zero waste guidelines for all events and conferences held on campus. Other sustainability successes and current initiatives include:

- Receiving a Gold rating in the Sustainability, Tracking, Assessment and Rating System (STARS),
- Maintaining a Revolving Sustainability Fund, which provides \$250,000 in capital to fund conservation projects, of which anyone is eligible to submit an idea, on campus that provide immediate financial return,
- Conducting a pilot study, including adding 60 new recycling stations, in order to increase the amount of recycling captured from all of the offices on campus,
- Offering students that are moving out of residence a place to recycle or donate all of their unwanted stuff, and
- Having a Facilities Management Waste Reduction crew and a Waste Management Green Squad. (UVic, 2014)

### **1.5.3 Simon Fraser University (Vancouver, BC)**

Simon Fraser University (SFU) has implemented a waste and recycling program that synchronizes with the regional and municipal colour schemes for each waste stream. Other accomplishments include Green Lab certification, engaging in National Sweater day on February 6th, and creating a popular zero waste video. Their participation in National Sweater Day involves turning down the heat school-wide two degrees, which saves SFU 190 gigajoules of natural gas, reduced GHG emission by 95000kg, and offering incentives, such as, free coffee, hot chocolate and cookies (SFU, 2014).

### **1.5.4 University of British Columbia (Vancouver, BC)**

University of British Columbia (UBC) is currently in the process of reducing paper consumption on campus. They have mandated that all of the paper purchased for the university must consist of 30%, or greater recycled content. UBC's accomplishments include a reduction of approximately 4.7 million sheets of paper annually, which was calculated to be equivalent to 16 tonnes of carbon dioxide eliminated, and savings of \$90,000 in staff printing costs. Furthermore, in 2010/2011, UBC achieved a 65% reduction in paper consumption from the 2000 levels, even though they had a 34% student enrolment increase. Also, in 2010, their IT department eliminated the print version of the UBC telephone directory, and permanently transitioned to an online version (UBC, 2014).

### **1.5.5 University of Alberta (Edmonton, AB)**

University of Alberta (UofA) set a goal in 2012 to reduce paper consumption at the university by 50% from their 2011 levels, a paper consumption of approximately 60 million sheets, by implementing their Office Paper Cut campaign. UofA had also switched to 100% recycled content paper stock, which they calculated to have used 1,800 fewer trees, eliminated 14 cars worth of yearly GHG emissions, eliminated 3 garbage trucks worth of solid waste, and saved enough energy to power 14 homes (UofA, 2014).

### **1.5.6 Clark University (Worcester, MA)**

Clark University (ClarkU) has reduced their departmental paper consumption by 10%. They achieved this by giving the departments the option of switching to 30% recycled content paper, but did not mandate it. Other sustainability successes and current initiatives include:

- “Green” renovations:
  - Reusing and donating items from the fitness centre.
  - Replacing steam distribution lines with double-walled insulated pipe, which are expected to reduce thermal losses from 1,800 Btu’s per foot, to less than 80 Btu’s, resulting in fuel savings of 20%.
  - Installing water refill stations all over campus.
  - Installing energy-efficient hand dryers to reduce paper towel use.
- Turning off all projectors overnight, weekends and breaks.
- Upgrading all vending machines to Energy Star.
- Installing rain gardens that capture and biofilter storm-water runoff from the roof, and have incorporated native species to attract wildlife and for educational purposes.
- Has a student-run bike share program “Cycles of Change”, which includes a free bike repair clinic, info-sessions on how to fix your bike, or they can fix it for you. (ClarkU, 2014)

### **1.5.7 Boston University (Boston, MA)**

Boston University (BU) recently switched to direct deposit paychecks and electronic paystubs. They calculated that this saves BU approximately \$5,000 annually in paper costs alone, and approximately \$50,000 without the costs of paper checks. They further calculated that switching saves

3,000 pounds of paper, 30,000 pounds of wastewater, and eliminated approximately 9,000 pounds of greenhouse gas emissions annually (BU, 2014).

#### **1.5.8 University of Toronto (Toronto, ON)**

University of Toronto (UofT) estimated that they consume approximately 100 million sheets of copy paper annually, with associated greenhouse gas emissions of approximately 1,500 tonnes, and paper supply costs of over \$600,000. UofT introduced the option of reduced paper in course materials, the library and phonebook orders, but it is not mandated school-wide (UofT, 2014).

#### **1.5.9 Summary**

Based on the review of other institution's sustainability and environmental awareness initiatives, we have selected a number of promising strategies to incorporate into RRU existing practices. Through the use of CBSM, we intended to influence the behaviours and perceptions of staff and faculty in regards to printing. Furthermore, this information was used to develop RRU's very own green team, the CCP. The remainder of this report expands on these ideas and describes how RRU can decrease their GHG emissions.

## **2 ROYAL ROADS CAMPUS CONSERVATION PARTNERSHIP**

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The Royal Roads Campus Conservation Partnership (CCP) is a joint initiative that supports conservation and sustainability at Royal Roads University (RRU).

### **2.1 CCP STRUCTURE**

#### **2.1.1 Vision Statement**

Continually strengthen the on-campus partnership by promoting sustainability awareness.

#### **2.1.2 Values**

In order to maximize the benefit of the CCP the following values have been developed:

- Working in unity to achieve a goal;
- Exchanging ideas;
- Thinking critically to solve problems;
- Addressing sustainability issues and concerns at RRU;
- Ensuring a continual presence; and
- Establishing a strong foundation.

#### **2.1.3 Purpose**

The purpose of the CCP is to promote sustainability awareness and education in alignment with RRU's sustainability mandate. The creation of this partnership will promote conservation through sustainability stewardship on campus. The partnership aims to target an interdisciplinary approach by bringing students and faculty together to work on sustainability initiatives. The CCP will encompass intrinsic ecological values such as unique ecosystems and species of concern on campus. The CCP will also manage local ecosystems by invasive species removal and preservation of sensitive habitats. Some of CCP monthly themes have been targeted towards waste stream diversion, energy use reduction, and overall behavioural changes promoting sustainability.

#### **2.1.4 Location and Identity of Place**

It is essential to create a permanent place where the members of the CCP can meet. Converting a breakout room into a designated meeting area for the CCP will increase their on-campus presence and awareness. It would also provide a convenient place for members of the CCP to hold meetings and

conduct research. This area could include a pegboard for volunteer opportunities including environmental initiatives on campus and in the community.

The former Philosophers Café would be an ideal location to allocate to the CCP. This space is currently underutilized and could be repurposed. Potentially, this area could serve as a gathering place for faculty and student lecture series, discussions on environmental issues, and viewing of influential environmental documentaries. A monthly video series consisting of documentaries, along with a discussion session afterwards would be a valuable addition to campus sustainability culture and student activities. There are a variety of critically acclaimed environmental documentaries to choose from, including: Promised Land, The Cove, Blackfish, An Inconvenient Truth, Gasland, Blue Gold: World Water Wars, Blue Planet: Seas of Life, Food Inc., No Impact Man, Tapped, and The End of the Line.

### **2.1.5 Membership**

Membership for the CCP requires a model that fits with the university's students, staff and faculty, as well as provides the option of short or long-term commitment. This is achieved by offering various levels of responsibility and time commitment. The highest level of membership would include students and chosen faculty presidents who will hold the highest responsibilities of structure and organization within the CCP. This group, known as the board of directors, will host regular student and faculty meetings to discuss the role and responsibility of the CCP. The board of directors will also be in charge of planning and organizing on-campus events.

Due to RRU's continual changeover of students, it is important to create different levels of participation with varying degrees of time commitment. Individuals who are unable to commit to full-time participation, and still want to be a member of CCP, can take on volunteer responsibilities. These members are the driving force of the CCP, as they are responsible for promoting the events and activities that the CCP hosts.

The involvement of individuals from different programs will add to the diversity of the CCP and provide opportunities for them to showcase their professional abilities. Communications students could focus on promoting events and creating awareness, while science students can be involved in environmental discussions and research. Other required skill sets could include people in community relations, event planners, discussion leaders, meeting coordination, operational tasks, and marketing.

### **2.1.6 Student Involvement**

Fostering student participation can be achieved using two methods; raising awareness of the CCP on campus and advertising the CCP through the initial RRU student handbook distributed to students

prior to the start of their program. During the first week of any on-campus full-time program, information regarding the CCP and registration can be communicated during the orientation presentations. The CCP presentation will highlight the structure of the CCP, current projects, and the ways to get involved. The objective of the orientation presentation is to inform students about campus life, and ways they can create positive change to enhance their university experience. Campus life is very hectic and busy; therefore, it is important to relay information regarding the CCP to the students upon their arrival so that they can adequately plan their time. This presentation has been designed so that any CCP member can deliver the short PowerPoint presentation to new cohorts. Table 1 identifies the start dates for the on-campus programs starting in 2014 and 2015. Students from these eleven programs could potentially make up the student portion of the CCP.

*Table 1: Start date and duration of next year's on-campus programs at RRU taken from the RRU prospective students' page.*

Program	Delivery	Duration	Start Date
Master of Global Management	On Campus	12 month or 18 month	May 5, 2014 Sept 8, 2014 May 11, 2015 Sept 8, 2015
Master of Arts in Intercultural and International Communication	On Campus or Blended	18 months or 22 months	Sept 29, 2014 Sept 8, 2015
Master of Arts in Environment and Management	On Campus or Blended	2 years	Sept 6, 2014
Master of Arts in Tourism Management	On Campus or Blended	1 year or 2 year	May 12, 2014 May 19, 2015
Bachelor of Business Administration in Sustainability and International Business	On Campus	2 years	Aug 25, 2014 Aug 24, 2015
Bachelor of Commerce in Entrepreneurial Management	On Campus or Blended	12 month or 24 month	Sept 15, 2014 Sept 14, 2015
Bachelor of Arts in Professional Communication	On Campus or Blended	12 month or 24 month	Aug 2, 2014
Bachelor of Science in	On Campus	12 months	Sept 8, 2014

Environmental Science			Sept 8, 2015
Bachelor of Arts in Justice Studies	On Campus or Blended	12 month or 2 years	Sept 2, 2014 Sept 8, 2015
Bachelor of Arts in Global Tourism Management	On Campus	1 year or 2 years	Sept 15, 2014 Sept 14, 2015
Bachelor of Arts in International Hotel Management	On Campus	12 months	Sept 15, 2014 Sept 14, 2015

It is also crucial for CCP to consider ongoing recruitment throughout the year, especially during events and activities. Recruiting volunteers for specific events will encourage participants and those students who can only promise a limited commitment in the CCP.

Ongoing recruitment is needed to increase volunteer numbers for larger events and is a good way to introduce people to the CCP. Incentives for student participation include:

- Create a positive change, whereby they can see the effect of their effort being implemented;
- Improve campus culture and experience;
- Gain volunteer experience;
- Network with students from other disciplines; and
- Network with staff and faculty.

### **2.1.7 Faculty and Staff Involvement**

The RRU 2008 Sustainability Plan states that “Sustainability leadership demands the active contribution and enthusiastic participation of Royal Roads employees at all levels” (RRU Sustainability Plan, 2008). This indicates a clear need for staff and faculty involvement in sustainability initiatives at RRU. Fostering participation of staff and faculty will be critical to the success of the CCP. Prime candidates would be those members of staff and faculty who already value sustainability on campus. These individuals would provide a voice for sustainability, and motivate participation in sustainable practices, in offices throughout the school, as well as the classrooms. Another method to foster sustainability awareness and participation is job-mandated sustainability responsibilities. By incorporating sustainability initiatives into RRU’s staff and faculty job descriptions, employees commit themselves towards allocating part of their time to these initiatives without compromising their other job requirements. Incentives for staff and faculty participation include:

- Create a positive change;

- Work with other staff and faculty on campus;
- Mentor students;
- Provide and promote leadership; and
- Create and promote campus culture.

#### **2.1.8 Partnerships**

Partnerships with all RRU programs and the community will increase the scope of influence for the CCP. It would allow students from different academic backgrounds to gain awareness and to make a difference at RRU. Working with the Royal Roads University Student Association (RRUSA) will play an important role in planning and promoting student events. Furthermore, incorporating the CCPs initiatives into program coursework, such as BSc. students presenting and discussing research, or conducting environmental issues, could provide a strong partnership between the CCP and the university. This would also provide the CCP with more resources and efficient time management skills, due to the projects contributing to the students' credits. Also, partnerships with the RRU Energy Working Group would be vital in collaborating on energy conservation projects.

#### **2.1.9 Event Calendar**

This section describes a schedule of events for a full calendar year. It represents a mechanism with which the CCP can maintain momentum. Included within this report are each month's proposed topics and suggestions for effective campaigns for awareness.

##### ***2.1.9.1 September – Waste, Recycling and Composting***

The idea behind this month is to promote all of the waste, recycling and composting programs and initiatives at RRU. Since September is the beginning of most programs, waste stream management can be incorporated as part of the student's orientation to campus. An online component should be included into this campaign, as a way to involve all online programs and facilitate an interactive delivery of information. The educational campaign will continue with information sessions and demonstrations facilitated by the CCP. An overview of how RRU diverts waste from the landfill by recycling and composting should be conducted. In addition, information should be provided that indicates why recycling and composting is important for the school and the environment. This topic is especially important for international students, as some areas of the world do not have similar waste stream management as RRU. By involving faculty and staff in diffusing this month's information, students will be continually encouraging students to participate in projects and initiatives around RRU.



#### **2.1.9.2    *October – It's Inexcusable, Go Re-Usable***

“It's Inexcusable, Go Re-Usable” month will promote the use of re-useable water bottles, hot liquid mugs, and Tupperware™ containers. The primary reminder for students and faculty to opt for reusable items will be signage and marketing in the cafeteria with the month's slogan prominently displayed. Promotional campaigns will include reminding individuals to “eat in” when ordering food from Habitat, reducing waste by choosing to use take-out containers and educating cafeteria customers of the discount that comes with bringing your own re-useable mug. Faculty, staff, students, and visitors can be encouraged to use re-useable containers on a daily basis by emphasizing the health, social, financial, and environmental benefits relating to re-useable products.

#### **2.1.9.3    *November – Don't be a Threat, Throw out your Cigarette***

“Don't be a Threat, Throw out your Cigarette” month will promote the proper disposal of cigarette butts, the use of designated smoking areas, and disposal systems provided by RRU. Educational campaigns will consist of bringing awareness to the environmental implications of throwing cigarette butts on the ground, such as pollution, animal health issues and fire hazard. Spreading the word about the negative health effects of smoking and second hand smoke will also be a strong focus for this month, with the aim of improving the health of RRU's students, staff and faculty by improving air quality. We also plan on reminding students, staff and faculty of the provincial regulations regarding safe smoking distances from building entrances.

#### **2.1.9.4    *December – Sweater Weather***

“Sweater Weather” month will promote wearing more layers to work and school, as well as reducing the temperature of RRU buildings campus-wide by two degrees (SFU, 2014). Promotional campaigns will include reducing the use of individual space heaters, as well as running an ‘Ugly Sweater Day’ competition on the Friday before final exams. This competition will encourage faculty, staff and students to wear more layers inside of RRU, while taking part in school activities and competing for prizes. Announcing school wide cost savings and carbon emissions savings that resulted from the initiative can provide positive reinforcement for students, staff and faculty.

#### **2.1.9.5    *January – Save the Timber, Avoid the Printer***

“Save The Timber, Avoid the Printer” month will start the calendar year with the continuation of the CCP's paper reduction campaign. This theme month will target not only the staff and faculty, but also the students of RRU. This will be done using awareness campaigns, such as, “STOP! Do you need to print this?” prompts on the computer screen, double-sided printing, printing multiple PowerPoint slides

on one sheet, promoting online documents (.pdf), re-using paper for non-professional documents, and recycling paper. Activities for this month will include an intra-departmental paper reduction competition during the second week that will evolve into an inter-departmental competition during the last week of the month.

#### **2.1.9.6 February – All Out, Lights Out**

“All Out, Lights Out” month will promote using natural light throughout the day rather than indoor lighting. Awareness campaigns will include the use and dispersion of the month’s slogan (All Out, Lights Out) to remind individuals to turn the lights out when they are the last out of a room. The objective is to get individuals to think about turning off desk lamps, working/studying by windows, and studying in large rooms instead of separate break-out rooms to reduce the electricity demand related to indoor lighting. Activities for this month will include promoting the switch to motion sensing lights, demonstrating energy efficiency of the different types of light bulbs, and explaining how reducing the amount indoor lighting used school-wide can contribute to environmental sustainability.

#### **2.1.9.7 March – Double Check, Disconnect**

“Double Check, Disconnect” will promote school-wide disconnection of electronic devices that are not in use. Promotional campaigns will include energy and heating efficiency demonstrations. Also, The CCP will promote the benefits of unplugging unused items through education on the potential for savings. Potential appliances that may benefit from being unplugged regularly are: printers, projectors, lab equipment, personal heaters, fans, phone chargers, and kitchen appliances. The CCP should pilot a small number of power bars to be installed in the galleys, study areas and offices. Students and faculty should be encouraged to participate in the practice of unplugging their appliances at home in order to reduce their electricity bill.

#### **2.1.9.8 April – Campus Ecosystems**

“Campus Ecosystems” month will promote the health, understanding and appreciation of the various ecosystems within RRU’s vast campus. Promotional campaigns will include motivating individuals to go outside for all breaks during the day, disconnecting themselves by leaving their mobile devices behind, and participating in outdoor activities such as using the campus trails. Awareness campaigns will include Earth Day events on campus and educating faculty, staff, students and visitors to avoid sensitive areas on campus, and why certain areas of the campus are not as heavily groomed as the Castle grounds.

This month, CCP will organize lunchtime walks a few times a week that will give them the opportunity to explain and educate persons on why the grass might not be mowed (e.g. Gary Oak ecosystem) on a regular basis, reasons behind why dead standing trees are not cut down or removed, and to stay away from specific areas on campus during certain seasons (e.g. snake hibernacula, etc.).

#### ***2.1.9.9 May – Don’t Waste E-Waste***

“Don’t Waste E-Waste” month will promote the proper disposal and re-use of electronic waste from home and from RRU. Promotional campaigns for this month will include having an electronics waste recycling company come in either by hire or volunteer to educate the Royal Roads Community on the importance and the impacts of sorting this waste stream. This may also involve pick-up of student, faculty and staff e-waste. Activities planned for the month include an electronics swap to provide an alternate to discarding still working but unused electronic items.

#### ***2.1.9.10 June – Here’s your Motivation for Alternative transportation***

“Community Conservation, Alternative Transportation” month will promote the use of alternative transportation for the commute to school and work. Promotional campaigns will include encouraging faculty, staff and students to walk, bike, bus, or carpool to work and school through participating in a ‘Commuter Challenge’. Incentives will be offered for students who score highest on the commuter challenge through donations from local business such as bike and coffee shops. Extra facilities will be provided such as additional bike racks, free lockers, and complimentary coffee in the mornings.

#### ***2.1.9.11 July – Suit Up, Clean Up***

“Suit Up, Clean Up” month will promote maintaining a litter-free campus. Promotional campaigns will target eliminating the habit of littering and education on the implications of garbage around campus including the surrounding water bodies. Activities will involve a weekly campus cleanup of the lagoon, ponds, trails, parking lots, tree lines, and around all of the buildings. Social marketing of photos of the cleanup can be posted to Facebook and Twitter with the hashtag “#RRUcampusclean”.

#### ***2.1.9.12 August – Here’s a Tip, Stop the Drip***

“Here’s a Tip, Stop the Drip” month will promote conserving and reducing the amount of water used on RRU campus and in the surrounding communities. Awareness campaigns will include illustrating the average amount of water used at RRU, per person, and per household, which will hopefully not only change habits while at RRU, but also impact homes and the community as well. Promotional campaigns will include instructing faculty, staff and students how to report water leaks on campus and how to reduce their water usage at school, work and at home using certain methods. Suggestions will be made such as,

shutting the water off when brushing teeth and other sink activities, not watering the lawn, replacing washing off the driveway with sweeping, quicker showers, and using the low flow setting on the shower and toilet.

## **2.2 CONCLUSION AND RECOMMENDATIONS**

The greatest challenge for RRU with regards to creating a “green team” on campus is the lack of continuity between the entering cohorts every year. To assist with this challenge, we have developed recommendations for forming a green team, to ensure a continual presence of sustainable initiatives on campus from year to year. This framework will allow the CCP to identify with a location, facilitate recruitment, lengthen memberships of students, and encourage staff and faculty involvement.

Providing CCP with a designated meeting area will facilitate student contact with the partnership and allow for convenient communication. Information about the CCP will also be provided to students in the student orientation handbook prior to their arrival on campus. Upon arrival, recruitment seminars will take place with each cohort to spread awareness of the group and promote RRU’s views on sustainability. This CCP framework will allow students to customize their membership by offering different positions that require different levels of commitment. The template for the CCP’s customized monthly events has two objectives: educating the students about different sustainable themes, and creating trends throughout the month in order to keep the students interested and motivated. The involvement of the staff and faculty at RRU is a key factor in continuity of the CCP. To achieve this, incorporating the involvement in sustainability initiatives on campus should be part of the employment mandate.

We recommend that RRU review this framework and consider executing it in the following year. The CCP will be available to aid the Office of Sustainability with a number of their sustainability initiatives, and spread awareness to students, from fellow students. In previous years, sustainability initiatives have been incorporated in on-campus courses. Assigning one of CCP’s themed months to this class will allow students who have not considered participating in the CCP, the chance to step into a role. Working with the CCP will give them sustainable work experience and broaden their knowledge. The students’ contribution to the CCP will allow them to network with other RRU students and faculty, while creating a strong campus culture.

## **3 ENERGY CONSERVATION**

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### **3.1 INTRODUCTION**

Having been constructed recently, the LIC is the most energy efficient building on campus. It has its own variable frequency drives (VFDs) and direct digital control (DDC) system which allows the Physical and Environment department to control the building's energy use and consumption. In order to obtain heating data for the other main buildings on campus, such as the Grant building, manual monitoring and recording of energy consumption data is required on a daily basis. The purposes of having readily available data is to be able to observe the peaks and dips in energy consumption, and monitor any trends on a daily, monthly and yearly basis. Having this knowledge would be useful in order to find ways of reducing each building's energy consumption.

RRU has no database of readily available data regarding energy use for either heating or electricity on campus. The university aims to have high resolution heating and energy data for each individual building on campus. The LIC is the only building that currently has the infrastructure for collecting this data. Such high quality data would help prioritize areas that need improvements and quantify the gains once improvements have been made.

### **3.2 WHY IS ENERGY CONSERVATION IMPORTANT**

Research was conducted on methods for energy conservation by talking to the engineers and staff at RRU who work in that department and manually gathered energy data for us. Through this research the following points were compiled to lower energy consumption and reduce greenhouse gas emissions. This list of priorities includes continual data collection and analysis to determine which buildings need the most updating (installation of DDCs and VFDs). These updates will lead to increased monetary savings and reduced greenhouse gas emissions. Suggestions on the list also include having more classes scheduled in the LIC building as opposed to other older, inefficient buildings throughout campus. This strategy would include maintaining certain buildings at standby temperature on weekends (Grant, Millward, Nixon, and Muse) as a way to reduce energy consumption and costs.

### **3.3 DIRECT DIGITAL CONTROL SYSTEM (DDC)**

DDC systems consist of digital device points, which either sense information or control components of a building's heating, ventilating, and air-conditioning (HVAC) system. This system can

allow the control of all (or just one) of these device points from one single computer program, allowing the user the ability to monitor and control the temperature and ventilation from a central location (BSD Solutions, 2012). Advantages of the DDC include greater accuracy in energy management and fine-tuning of heating locations and timing. DDC systems use electronic sensors, enabling a higher degree of accuracy with temperature control (BSD Solutions, 2012). Data management, documentation and analysis tools from each digital device point allow the operator to monitor specific areas (or habits) that may be the source of higher energy consumption. This gives the user insight into prioritizing certain upgrades for the building and allows the user to analyze the higher peaks in energy consumption. These abilities are conducive towards understanding where energy saving investments is required. (F. Havekotte, personal communication, February 2014)

### **3.4 VARIABLE FREQUENCY DRIVES (VFD)**

A Variable Frequency Drive (VFD) is a type of controller that regulates the speed of an electric motor by varying the frequency (speed in RPMs) and voltage at which the motor functions. If a machine does not require its electric motor to run at full energy, the VFD can slow the frequency and voltage to meet the minimum requirements of the electric motor's load. If the application's motor speed requirements were to change, the VFD would automatically change the motor speed to meet the new requirements. (VFDs.com, 2014)

Electric motor systems consist of more than 65% of power consumption in industry. Installing VFDs and running the electric motor at 70% can reduce energy consumption by as much as 50% (F. Havekotte, personal communication, February 2014). By installing variable frequency drives on electrical motors for blowers and pumps, this gives operations the ability to adjust the speed of the motor to meet the demand, which reduces energy consumption. VFDs allow slow starts on electric motors to reduce spikes in amperage and reduce the overall load on the system. Additionally, using VFDs reduces wear by ensuring the machine's longevity while reducing operational costs.

Reducing the voltage and frequency of a motor is more efficient and causes less strain on the motor over a longer duration. This avoids issues such as electrothermal overloads, phase protection, under voltage, overvoltage, etc. Furthermore, starting a motor with a VFD will not subject it to "instant shock" of starting up at full capacity, but will allow the motor to start smoothly increasing speed until it reaches optimal operating conditions. (VFDs.com, 2014)

### **3.5 PRIORITIZED METHODS FOR REDUCING ENERGY CONSUMPTION**

We have several methods for reducing electricity and gas consumption. These methods have been prioritized below by cost-effectiveness starting with the highest priority and moving to the lowest priority.

### **3.6 SCHEDULING**

The Learning and Innovation Center is the most energy efficient building on campus. The building is equipped with its own DDC system and a number of VFDs to reduce the motor speeds and save up to 70% more energy (VFDs.com, 2014). Prioritizing this building with regards to class location and scheduling could result in savings of approximately 50% on Heating Ventilation and Cooling (HVAC) (F. Havekotte, personal communication, February 2014). Not only can this be done during the week, but concentrating classes and students who are looking for a quiet area to study, in this building during the evenings and weekends can also contribute significant savings. The Grant, Nixon, Mews, Arbutus and most other buildings on campus consume high amounts of energy to house one or two students. Closing these buildings on evenings and weekends will allow all the rooms in the LIC, the most energy efficient building, to be filled to capacity first, taking advantage of its high level of efficiency.

### **3.7 HEATING AND COOLING UPGRADES**

To assess which buildings will need the most urgent upgrades, staff in the Environmental and Physical Resources Department manually documented monthly results for energy consumption, both for electric and gas. After reviewing the data, the most inefficient buildings campus with relation to their size are the Recreational Center, for gas consumption, and the Library, for electricity consumption.

Though these buildings are the highest in energy consumption, it was determined that renovations to the Grant building would be most beneficial.

The Grant building is one of the most frequently used and high traffic buildings on campus. It has both high gas and electricity consumption rates, and we have been told that installing DDCs would cost approximately \$60,000. Furthermore, the boilers that have been recently installed in this building seem to be inefficient and using a lot more energy than originally estimated. Installing a new boiler system in the Grant building, similar to the boiler upgrades done to the Hatley Castle (which saves the university \$20,000 per year) could increase heating efficiency to the Grant building. (F. Havekotte, personal communication, February 2014)

According to the collected data, electricity consumption was highest in the LRC (APPENDIX A). We believe that the root of this cause is due to the interior lights, computers and printers that must remain on during hours of operation. This building is greatly shaded by the trees in the garden and forest, which add to the need for indoor lighting. Since the lighting is the largest draw of electricity, not much can be done without rewiring the lighting units. Furthermore, if this is ever to be considered, sectioned lighting with dimming control should be contemplated to reduce lighting when library traffic is low.

### **3.8 CONCLUSION AND RECOMMENDATION**

The use of energy at RRU is one of the top sources of GHG emissions on campus. This had led us to research methods for quantifying energy use by building. The aim of this research is to identify the most cost effective methods for reducing energy use at RRU. Through our research we found that the Grant Building, LRC and Recreation Center were the largest consumers of energy relative to their size. Of these three options the Grant building appears the most feasible for improvements, as heavy infrastructural changes would be required for the LRC and Recreational Center. The changes proposed to the Grant building include the test installation of VFDs, DDCs and the rescheduling of building use in ways that will allow more efficient heating cycles. We also recommend that the most efficient buildings be prioritized with regards to scheduling classes. This will ensure that only the most energy efficient buildings on campus would be used, therefore conserving more energy and reducing the GHG emissions on campus.



## **4 CHANGING BEHAVIOURS AROUND PAPER USAGE**

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### **4.1 INTRODUCTION**

Our paper reduction campaign included running a quantitative analysis to determine the overall impact of CBSM strategies on printing paper use. The foundation of the campaign was to identify the benefits of and barriers to reducing paper usage through surveys and focus groups. The foundation was built upon by piloting chosen strategies for behavioural change, and monitoring the response of staff and faculty at RRU. Our methods were based on those established by Doug McKenzie-Mohr in his book *Fostering Sustainable Behaviour*. CBSM strategies of commitment, social norms, social diffusion, prompts, communication, incentives, and convenience were used in our research project. We assessed the various strategies regarding their effectiveness based on staff and faculty feedback and successful reductions in printing. The information identified during this research will be essential in moving towards a more paper free environment at RRU. Our paper reduction campaign used a combination of CBSM strategies; however the main tool we used was social norms based on the printing data we received for all staff and faculty at RRU.

### **4.2 BACKGROUND**

Our research methodology was largely based on a study involving behavioural science and energy consumption. The energy company, Opower, conducted a study with the aim to discover how people react when they receive information that they stand outside the social norms for energy consumption (Opower, 2014). In that case, electric bills were delivered door-to-door, but rather than being private for the homeowner, individuals could obtain basic positive or negative signals about how their neighbours used energy.

When households were informed that their energy consumption was above average, energy consumption by these households was reduced significantly (Opower, 2014). Realizing that they were not part of the social norm made them more aware and conscious about their energy consumption. Not only did reducing their energy consumption officially make them part of the social norm, but they also reduced their monthly spending on energy consumption. Opower also conducted a study that uncovered that the customers' frustration of receiving high energy bills had a stronger effect than the delight of receiving a lower bill (Opower, 2014).

These results indicate that most individuals take into greater consideration their negative achievements, whether when compared to their neighbours or their own standards, versus enjoying their

smaller achievements, such as a low energy bill (Opower, 2014). This led researchers to believe that having negative results on something gives individuals more motivation to succeed than having positive feedback (Opower, 2014).

The main strategy that will be implemented in order to reduce printing paper use on behalf of faculty and staff will be a similar approach taken by Opower. With the readily available staff and faculty printing data, we determined the average number of printed pages per month among all staff and faculty at RRU. This number was used to represent the social norm of our sample population. We aimed to prompt those individuals that were above average by sending them an email that identified them as being above the social norm. Our objective was to motivate the above average printers to reduce the number of pages that they print on a daily basis. Furthermore, after prompting individuals with the email regarding their above normal printing habits, we also gave them the opportunity to contact us directly with the opportunity to commit to following our tips and suggestions in reducing their printing paper usage. We hoped that the email sent to staff and faculty of RRU would have a similar effect as the notifications provided by Opower to its clients.

## **4.3 METHODS**

### **4.3.1 Survey**

A twenty question pilot survey was developed and sent to staff and faculty at RRU with the objective of receiving their feedback. We targeted staff and faculty that were associated with our program, to ensure that we received the maximum number of replies.

After addressing the feedback from the pilot survey, we distributed the survey to staff and faculty at RRU. The survey was attached to an email sent by Cecelia David, the manager of desk and computer services. The email informed staff and faculty about who we were, the purpose of our survey, and encouraged them to participate in our research project. Sending the email through Cecelia, the creator of the original printing data email, was a strategy designed to increase the readership by having the email come from a familiar account. We wanted to avoid recipients deleting our survey invitation after receiving it from an unknown sender. Part of the email also contained our contact information (using the CCP email address), giving staff and faculty the opportunity to further participate in our study through focus groups, and email responses identifying the benefits and barriers regarding paper reduction. We left the survey open for 3 weeks and assessed the level of participation from various marketing strategies. We assessed the impacts of email, personal invitation and used Crossroads, the online RRU newsletters, as our communication methods. After three weeks, we closed the survey and began looking at the data and

making quantitative observations of the results using Excel graphing functions. These results indicated how conscious individuals were with regards to their printing habits, identify why some individuals print more than others, and lastly, if the staff and faculty at RRU are motivated in reducing their printing paper use and contribute to the reduction of greenhouse gases at RRU.

#### **4.3.2 Focus Groups**

We held two focus groups that were advertised through means of the survey, published in Crossroads, and in our monthly emails. We prepared some open-ended questions beforehand to facilitate the direction of the conversation. We recorded the sessions with an iPhone and had two group members' record responses on their laptops. The other members of the group ensured the prepared questions were answered while letting the conversation develop naturally.

After the turnout of the first focus group, CMS decided that advertising the survey and the focus group through personal contact would be more efficient. Two members of our team went to various offices throughout the university letting people know about our project, and asking for the support by completing the survey. They also informed staff and faculty about our focus groups, in the hopes of increasing attendance numbers. That same day, we saw an increase in survey participants by thirteen individuals.

Prior to the focus groups, we designed questions that would promote discussion and answer some unanswered questions from the survey. We began each focus group with introductions and understanding the different persons' work responsibilities and roles. Once everyone was present, we would present one of our discussion questions, and allowed the attendees to discuss amongst one another. This was beneficial because most individuals were from different departments of the university and had never interacted before.

Whenever the discussions would slow down, we would bring up another question from the list. Hosting the focus group at lunchtime was an attempt to increase staff and faculty turnout. We also provided candy and muffins at our focus group discussions to add to the appeal of attending.

#### **4.3.3 Printing Data**

The RRU computer services group collects printing information on all staff and faculty by logging individuals' print jobs. Everyone employed by RRU has a unique account ID linked to his or her name. Each time a RRU employee sends a document to a printer the date, time, account ID, number of sides printed, job details, and which printer the job was completed on is all logged into a database. The job details column indicates whether the print job was colour, single or double-sided, and the number of

sides printed. For our analysis, computer services removed the names attached to the account IDs to ensure anonymity was maintained for all employees. Computer services provided us with the raw data in a Microsoft Excel spreadsheet from January 1, 2010 to June 30, 2014. Due to the wealth of information and timeline, a purely qualitative approach was taken to compare these data. Excel's pivot tables were used to consolidate the data into meaningful summaries to identify historical trends and averages.

The printing records allowed us to determine all the above average printing accounts, so we could utilize CBSM techniques on these individuals. In 2011, computer services introduced a semi-annual email notification that informed RRU employees of their printing totals. Part of our approach was to combine Opower's campaign, improve the format of the semi-annual email, and send it to the above average print users (Opower, 2014). To make the most impact, individuals that are above average were identified and sent a tailored email.

The email was designed and sent to individuals that had above average sides of pages printed in the months of January, February, March, and April. We also asked for feedback and comments from the recipients in the email which is provided in APPENDIX B. The email was put into a draft folder and a member of the Office of Sustainability attached the names. This ensured that anonymity was maintained for the individuals receiving the emails.

## **4.4 RESULTS**

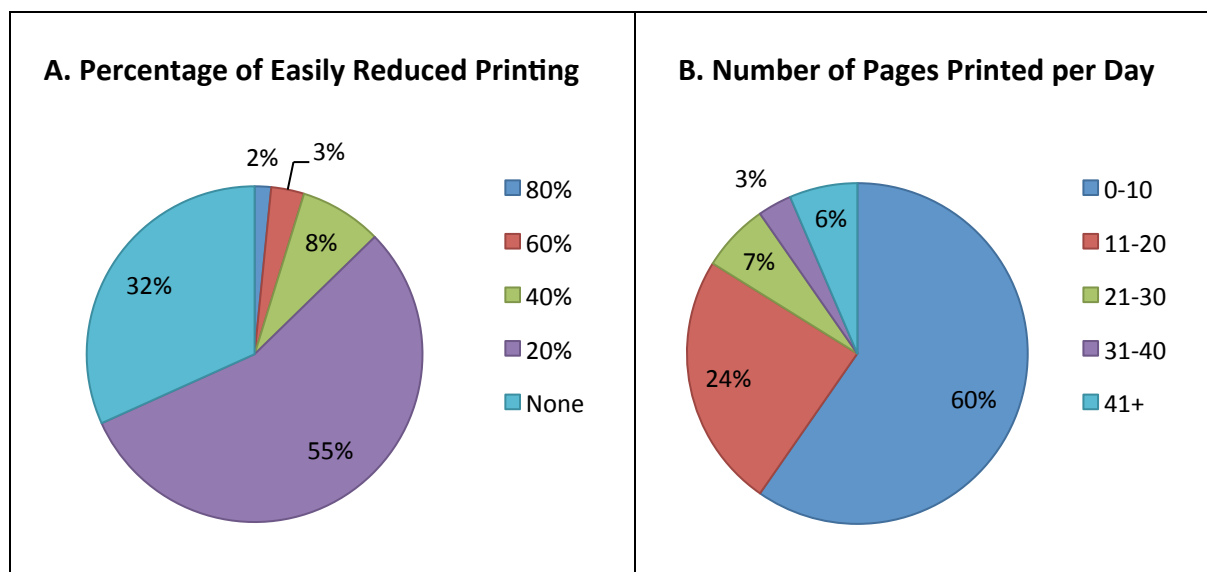
### **4.4.1 Pilot Survey**

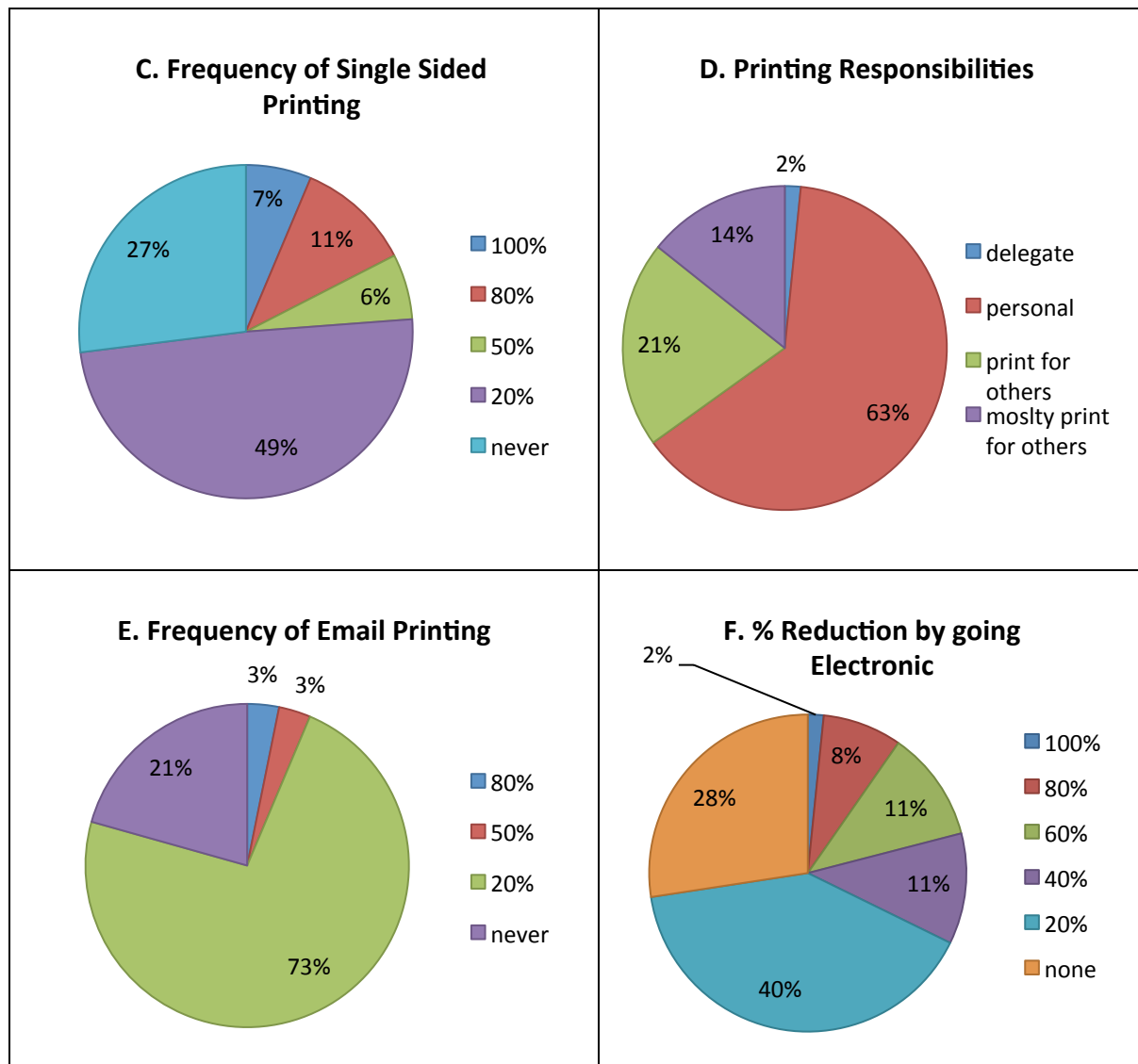
We sent out 12 pilot surveys, and received six responses, three were staff and three were faculty. The average age ranges were between 31-40 and 51-60 years old. The answers that were obtained from the survey proved to be very useful with regards to the effectiveness of the delivery and adequacy of the questions. It also provided some initial insight into the sustainability practices and printing habits on campus. We learned that most of these individuals do make an effort to sort their waste, turn their lights off and avoid using space heaters. However, we also uncovered information that indicated that most of the members that filled out the survey do not turn off their computers after a full workday. In general, individuals don't change the formatting to single-sided, with an average of 0-10 printed pages a day, yet some individuals print for others which explains some higher daily print estimates. It is encouraging to see that most people would be willing to reduce their quantity of printed paper, yet many individuals are not very willing to convert to paper-free practices.

#### 4.4.2 Survey

In total, 62 participants completed our survey. The average age range of RRU staff and faculty that participated was between 41 and 50 years old. On average, this demographic have been working at RRU between five and ten years, and judging by their sustainability responses (waste diversion, turning lights and computers off, etc.), working at RRU has been a positive influence on their environmental sustainability habits. These individuals believe they print approximately 0-10 pages a day, and only occasionally change the “print-double sided” function. Primarily, those surveyed find themselves printing emails, reminders, schedules, and learning materials. Many participants also voiced that they prefer print copies of certain documents, such as for grading papers or comparing reports.

Text boxes filled in by respondents provided positive feedback in regards to the semi-annual print report generated by computer services. Many respondents suggested the option of having dual monitors, work issued laptops, or iPads would decrease RRU’s printing paper use. Furthermore, many individuals mentioned the need to convert to more online processes with regards to archiving, registering and other administrative tasks. Another suggestion for individuals who occasionally print emails was to increase the university’s email inbox storage space. The limited storage space on RRU email accounts has resulted in participants printing old emails and filing them away to make room in their inbox for newer incoming emails. Lastly, 50% of the participants from the survey were not aware that RRU pays carbon offsets on the paper used on campus. All raw survey data is included in APPENDIX C.





*Figure 1: Summary charts of the survey results. Graph A represents the proportion of printing that respondents thought could be easily reduced. Graph B shows the number of pages printed per day of the respondents. Graph C represents the proportion of the time respondents changed the printing setting to single sided. Graph D shows the distribution of printing responsibilities. Graph E displays the how often respondents printed emails. Graph F shows the proportion of printing that could be reduced by going electronic.*

#### **4.4.3 Focus Groups**

The first focus group consisted of four staff members from the School of Environment and Sustainability, and one staff member from the Library. The focus group participants commented that they would be willing to go paper free, noting it would increase the efficiency of moving documents that required signatures and invoices. As of the time of the survey, users reported that the majority of printing was for important hard copy documents that required signatures. A tablet was suggested for meetings so

that important documents could be easily accessible without the need to print them. Electronic signatures could be easily emailed to different departments. The group also suggested increasing the email storage space to allow important emails to be saved, eliminating the need to print them. Another set of hard copy items are invoices, so the group suggested scanning and emailing invoices instead of copying and faxing. The group acknowledged that some materials, like important reference documents and schedules, would still be worth printing to have hard copies for quick reference.

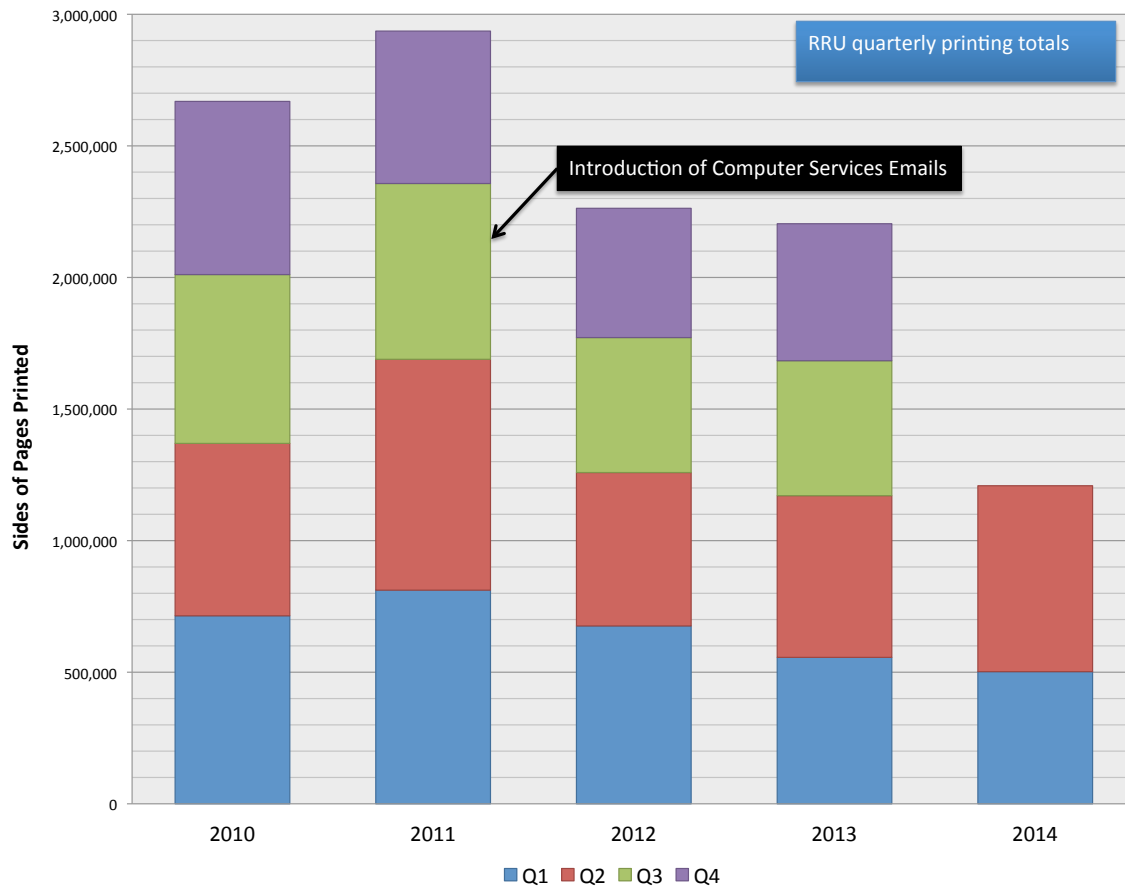
Our second focus group consisted of four staff members. The participants indicated that international admissions operate on a paper system for all applications. Files submitted electronically are printed for student files. RRU uses an ongoing admissions process which requires constant circulation of applications. This requires staff to walk files around campus to acquire the appropriate signatures. Participants suggested moving to a lumped admissions process would remove the need to walk files around, as signatories could come in once a month to review the appropriate files. Share-point was also suggested as a method for electronic signatures; however the security of this system is a potential concern. Our representative from physical resources informed us that all the work orders for the maintenance and garden staff are printed. This is an essential part of the operations of the facilities, as the work orders are also used as timecards for staff. Work orders are often printed multiple times as revisions are made. This accounts for a significant amount of paper, due the high frequency of weddings (56/year) and the ongoing garden and maintenance operations. The most efficient way to reduce this form of paper use is to train the event planners to correctly fill-out work orders to limit the number of revisions. The participants also commented on the effectiveness of reducing paper in their department through their own initiatives. Involving the entire office in paper reduction awareness will have a greater impact than individuals alone.

#### **4.4.4 Printing Data**

Figure 2 depicts the yearly printing totals at RRU. Each quarter is a different colour in the columns to emphasize the difference in printing throughout the year. 2011 was RRU's highest yearly printing total (2,936,033 sides), and was the year computer services introduced their semi-annual email notification (



Table 2). There was a large reduction in printing totals from 2011 to 2012 (673,000 sides). 2013 yearly printing total was quite similar to 2012.

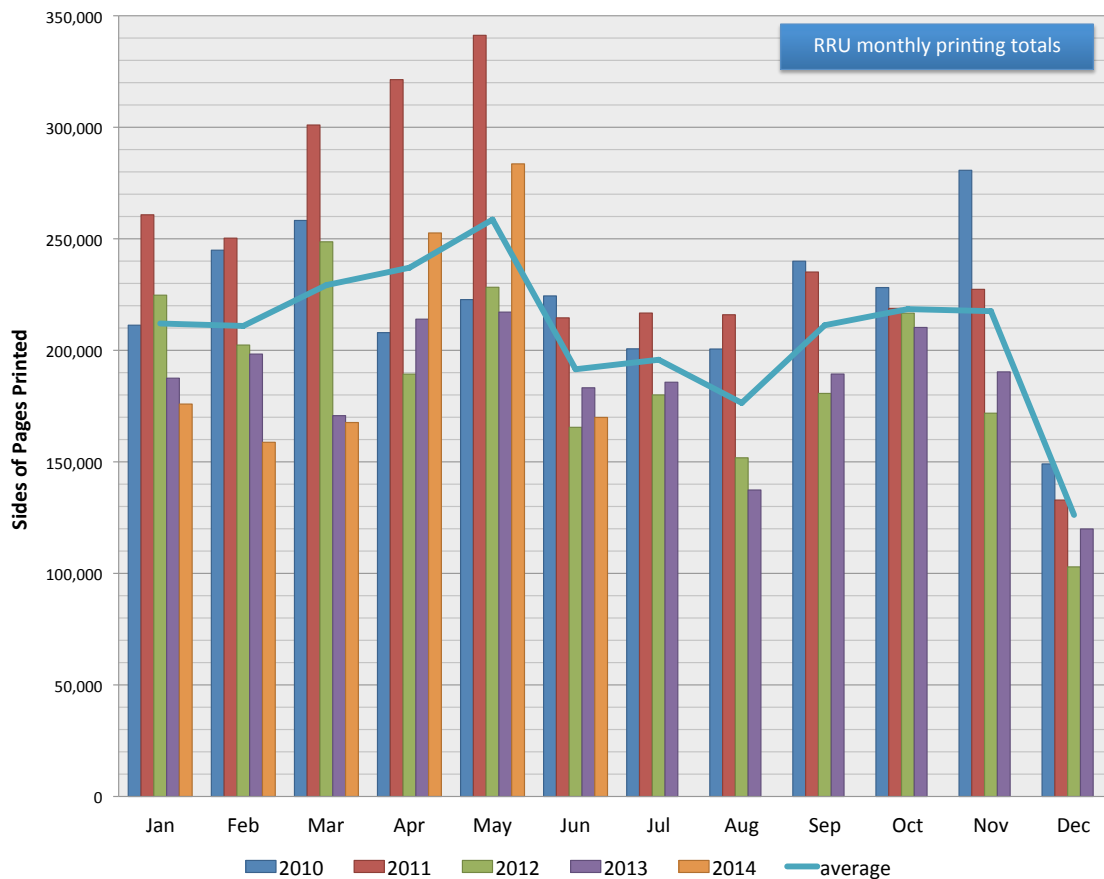


*Figure 2: A summary of RRU's historical printing totals divided by quarter.*

*Table 2: A summary of RRU's historical printing totals divided by month.*

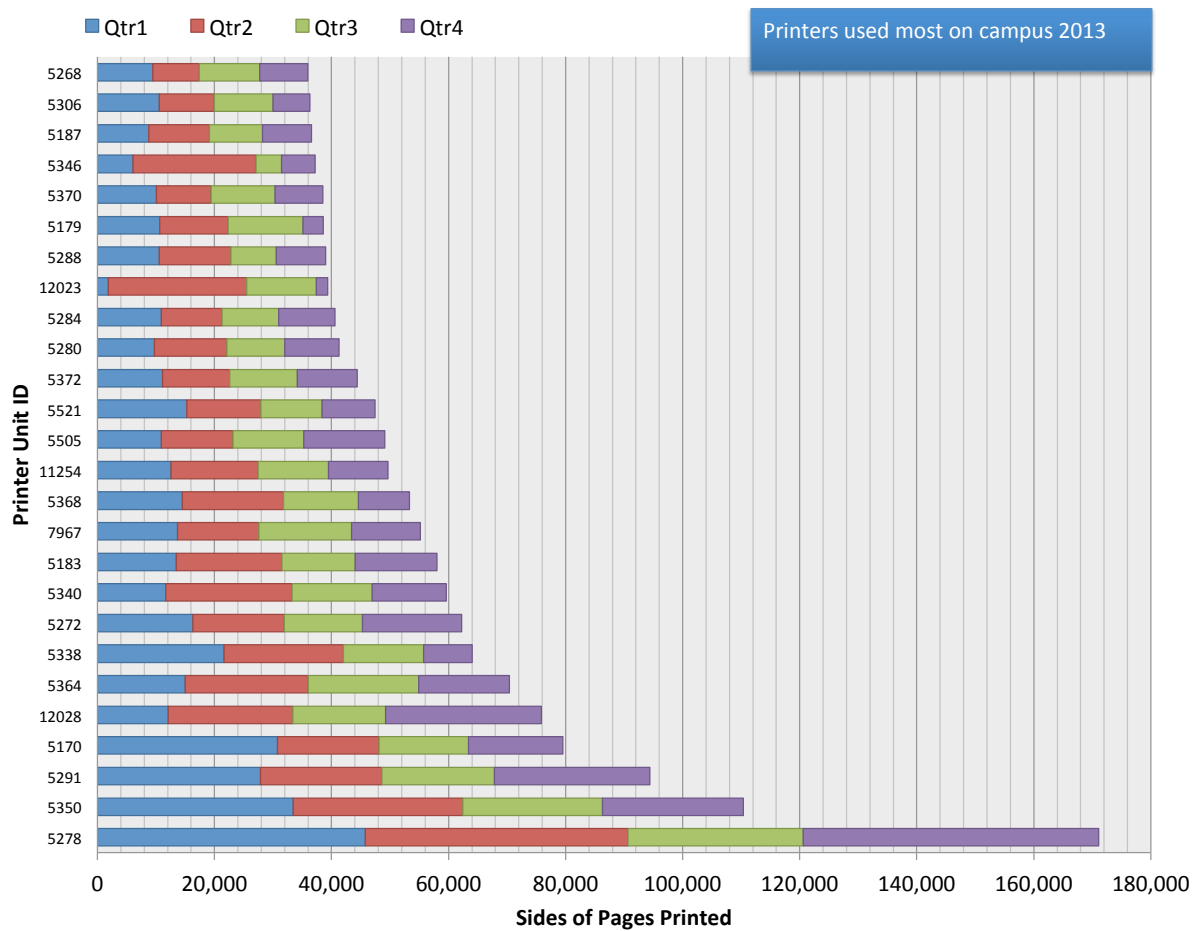
	<b>2010</b>	<b>2011</b>	<b>2012</b>	<b>2013</b>	<b>2014</b>
<b>Jan</b>	211265	260752	224722	187518	175928
<b>Feb</b>	244907	250288	202381	198334	158788
<b>Mar</b>	258239	301029	248653	170720	167649
<b>Apr</b>	207932	321338	189331	213986	252617
<b>May</b>	222749	341217	228294	217134	283593
<b>Jun</b>	224391	214565	165505	183217	169927
<b>Jul</b>	200684	216731	180030	185695	
<b>Aug</b>	200590	215943	151816	137395	
<b>Sep</b>	239976	235120	180691	189390	
<b>Oct</b>	228157	218821	216696	210254	
<b>Nov</b>	280728	227341	171830	190332	
<b>Dec</b>	149091	132888	102916	119938	
<b>Total</b>	<b>2668709</b>	<b>2936033</b>	<b>2262865</b>	<b>2203913</b>	<b>1208502</b>

Figure 3 depicts RRU's monthly printing totals compared by year. The blue line indicates the monthly average. Figure 3 indicates that the spring and fall months are when RRU employees print the most. May in particular has the highest volume of printing on average. Historically, December has the lowest volume of printing on campus. Additionally, there appears to be a lull from June to August, and printing increases in September.

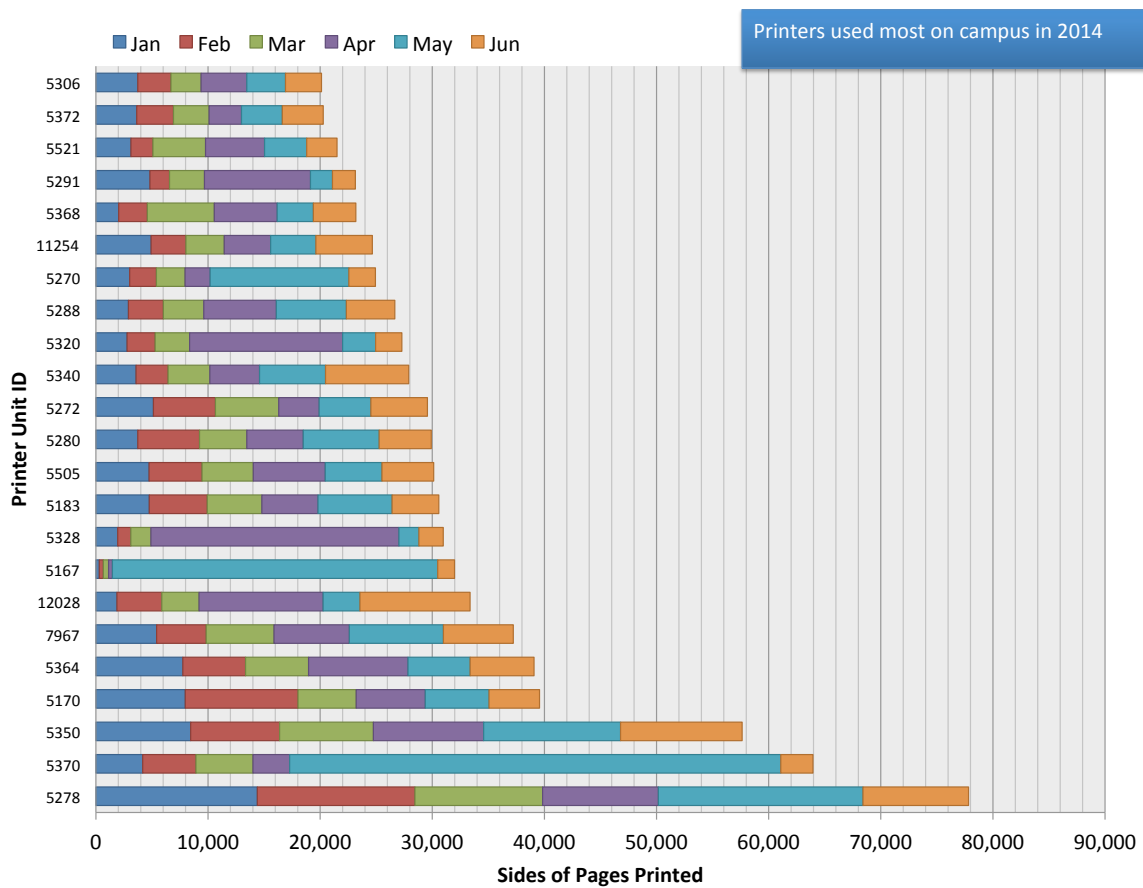


*Figure 3: RRU's monthly printing totals compared by year. The blue line indicates the average of each month.*

Figure 4 Figure 5 depict 2013 and 2014 totals for the most used printers on campus, respectively. All of the units displayed on the graph print over 35,000 sides a year. Unit 5278 is the most used printer on campus and it printed 171,060 sides in 2013, and 77,825 sides so far in 2014 (Figure 4Figure 5). In 2014, unit 5370 printed over 40,000 sides of pages in May alone (Figure 4Figure 5). All 2013 and 2014 printing data is attached in APPENDICES D and E, respectively.

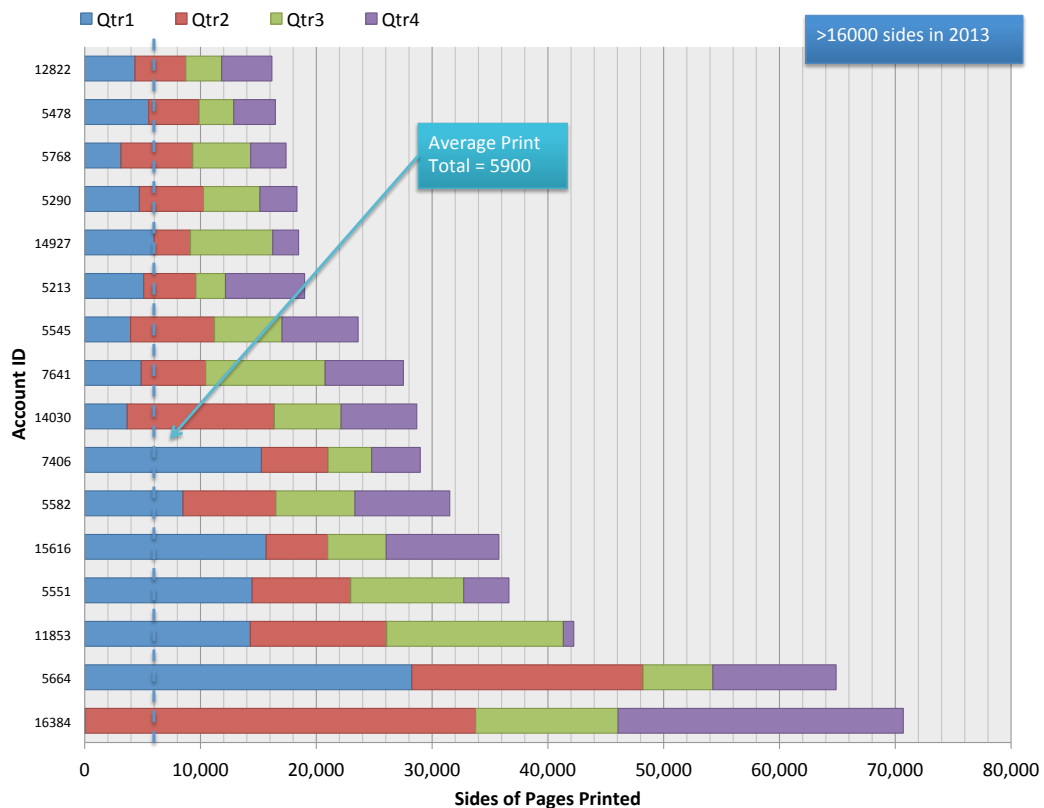


*Figure 4: The printers with the highest printing total in 2013 divided by quarter.*

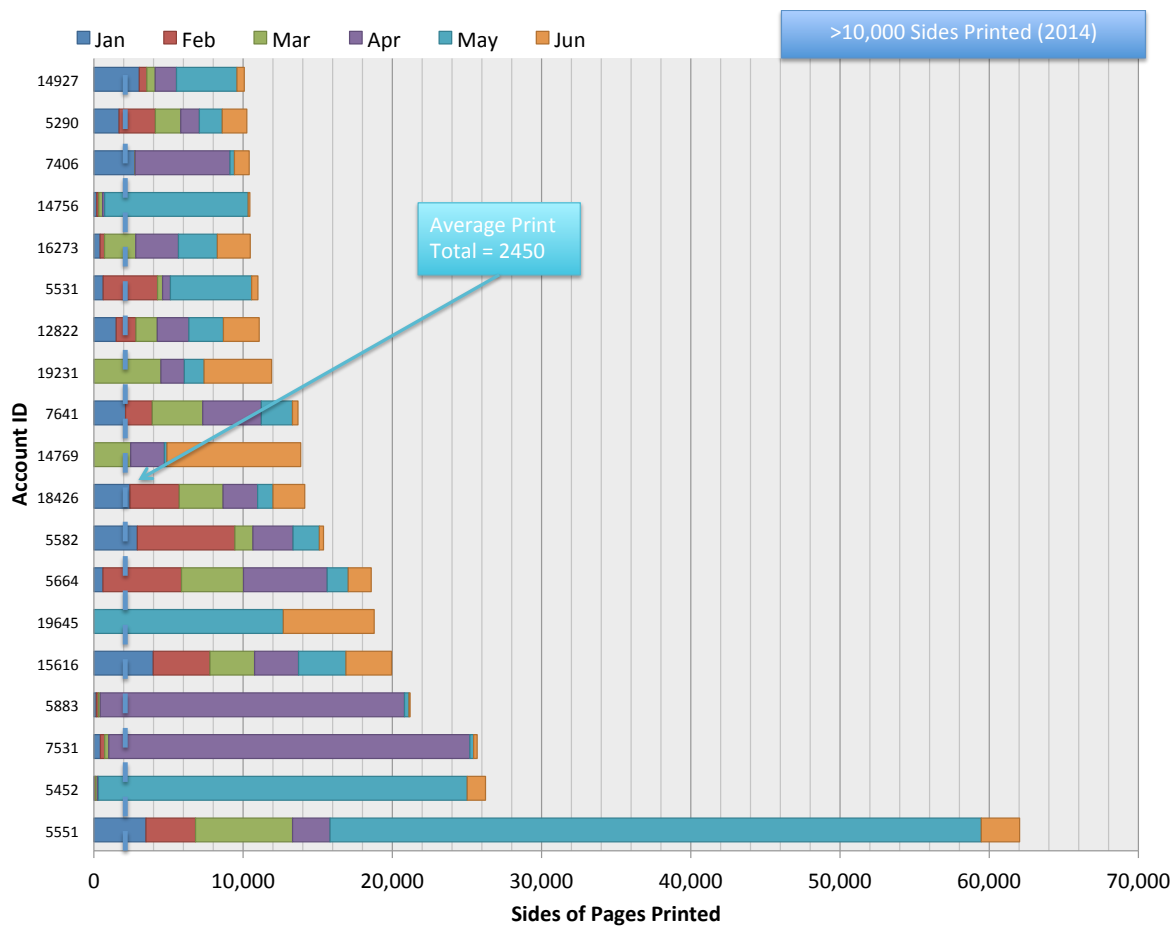


*Figure 5: The printers with the highest printing total in 2014 divided by month.*

Figure 6 shows the individual accounts that had the highest printing totals in 2013. Additionally, Figure 7 depicts the accounts that had the highest printing in 2014 until the end of June. There are six accounts that print over 30,000 sides and two individuals that print over 60,000 sides in 2013 (Figure 6). In contrast, there are already five individuals that have printed over 20,000 sides and one individual that has printed over 60,000 sides in 2014 (Figure 7).



*Figure 6: RRU employees that had the highest print totals in 2013.*



*Figure 7: RRU employee print account's that had the largest printing totals in 2013.*

## 4.5 DISCUSSION

### 4.5.1 Survey

The focus for our survey was to understand the printing habits of staff and faculty. The survey participants consisted of 87% staff, 11% faculty and 2% were designated as other. The results of our survey generally display the printing habits and perceptions of staff members as we were not able to gather a large amount of information from faculty members. We were able to gather information from a wide age demographic (21-61+ years old), with the largest proportion from the 41-50 years of age category. We feel that this accurately represents the population distribution of RRU employees. The majority of the responses were from staff and faculty that have been working on campus for over five years. We feel this gives a good representation of the printing practices of the university.

Based on the environmental sustainability questions in our survey we feel that the majority of respondents to the survey are conscious of their environmental footprint and consider the environment in their decisions. The large majority of staff and faculty that responded to our survey believe they could reduce their printing by less than 20% (Figure 1A). A small group of employees indicated that they could reduce their printing by more than 40%. We tried to focus on this small group for paper reduction because they already acknowledge that there is room for improvement.

The survey feedback showed that the majority of staff and faculty are printing less than ten pages per day, but a small fraction of people are printing over 40 pages per day (Figure 1B). The people that are printing a large number of pages per day would likely benefit by moving towards electronic files. Those with lower levels of printing would likely be able to make reductions using behavioural changes.

In response to the frequency of single-sided printing, the large majority of people rarely change the pre-set double-sided printing (Figure 1C). However, some individuals only print single-sided; this could be due to the nature of the document, such as financial reports.

When asked about individual printing responsibilities, the majority of people responded that they print for their job requirements, yet a portion reported that they print for others (Figure 1D). This was expected as some job roles within the university require printing for other people. Our research is focused on reducing paper printing for any given job description and does not intend to target individuals. The information we gathered from this survey question allowed us to focus more on what is being printed, and less on the individual. This is primarily due to the fact that there are people required to print documents that they do not use.

The frequency of email printing showed that a large majority of staff and faculty occasionally print emails (Figure 1E). This was expected because emails are the main method of communication and often contain important information.

When we asked what percentage reduction could be achieved by moving to electronic documents, we found varied responses (Figure 1F). A slight majority thought they could reduce 20-40%, but a quarter did not think they could make any reductions, and the other quarter thought they could reduce over 60% of their printing. This information helped us establish electronic documents as a major contributor to paper reduction, and was a key topic in our discussion groups.

#### **4.5.2 Focus Group**

We held two focus groups that were advertised in the survey, which was published in Crossroads, and in our monthly emails. These discussions allowed us to identify disparities and commonalities in behaviours between different departments of the university. Noticing these commonalities allowed us to



determine overall university changes that should be considered, along with department-specific behaviours that should be targeted.

The members of our focus groups gave us valuable and interesting insights as detailed within this report. We believe that to improve printing habits and promote sustainability behaviours on campus, it is important to listen to perceptions provided by employees. RRU personnel have a thorough knowledge of the university's inner workings, and have creative ways to improve efficiency and convenience. They informed that single-sided printing is required for formal and confidential documents. Unfortunately, some solutions voiced throughout of focus groups were also out of our scope, and could not be considered. Such solutions rooted mainly to the inner workings of the university and its confidentiality policies. Our focus groups were also slightly biased due to the inability to attract members of RRU faculty. Input from faculty would have been invaluable to our group since members of our focus group identified faculty as individuals that print the most. Discussions indicated that there are current efforts within the university towards converting to paperless systems. The extent of development of these paperless efforts varies between departments. Members of the focus group identified faculty as the highest printing offenders, so hosting a focus group with faculty would be a valuable source of information for future conversion towards electronic alternatives.

#### **4.5.3 Printing Data**

The printing information collected by computer services has provided insight into the behaviours of RRU's employees' printing habits. The yearly summary graph shows that RRU has reduced its total volume of printing since 2011, and that 2013 was the lowest year over the past four years (Figure 2). This indicates that employees, schools and offices are making a conscious effort to reduce the volume of printing on campus. However, when comparing month-to-month data, 2014 started as the lowest on record, but in April and May, the monthly totals were much greater than average, with 536,210 printed sides (Figure 3, Table 2). This is potentially concerning since April was when we introduced our email notification to the above average print accounts. This potentially indicates that our campaign was either poorly received or disregarded.

Figure 2 shows a drastic change with the introduction of the computer services email. These drastic changes resulted from major decreases in employees' printing habits, made by simple changes throughout the office. The CMS 2014 email also showed changes, yet the alterations that people made to their habits were not nearly as drastic (Figure 3). This can potentially be explained because all of the easy adjustments had already been made in 2012. This observation solidifies that further reductions in staff and faculty printing must originate from changes in operations and departmental duties.

Figures 4 and 5 indicate the printer units on campus that are used the most. These units printed over 30,000 sides in 2013 and over 20,000 sides in 2014. Since these units are used the most, it would be valuable to know whether these are the most efficient printers to operate. In addition, these printer units are also likely used by a particular school or department. By contacting that school or department directly, and uncovering what they are required to print, their volume of printing could be significantly reduced. These figures also reveal that printer unit 5278 has been the most used on campus for the past two years. This printer unit produces on average 82 sides per hour over the course of a year (Figures 4 and 5).

Figures 6 and 7 reveal the individuals that print the most on campus. Individuals seen in these graphs have more than double the printing average. The top two accounts produced 135,577 in 2013 and 88,281 in 2014 (Figure 6 and 7, APPENDICES D and E). These individuals would be worthwhile contacting directly to see what could be done to lower their print volume. Decreasing the highest print accounts would have a large impact on RRU's yearly total since the top three individuals combined account for over 10% of RRU's yearly total.

#### **4.5.4 CBSM Strategies**

Staff and faculty received their weekly Crossroads newsletter, in which the invitation to our survey was embedded in the newsletter. Individuals would need to log on to the school website and read through the newsletter to find the link to the survey. The 21 responses we received on the first day were likely those individuals that immediately opened their newsletter and found our survey. The days following the initial send out of the newsletter, no surveys were completed.

Due to this poor level of response, we decided to try a new strategy to enhance the survey submissions. Two members of CMS were sent to walk around campus and talk to staff and faculty departments to promote our survey, and the follow-up focus group planned for the following week. Through personal contact, we achieved verbal commitment from many individuals that they would complete the survey. Having two team members go to the faculty and staff directly, talk to them about the project, and motivate them to spread the word to their co-workers, created an immediate response to our survey results. Survey completion increased by 20 responses, nearly doubling the number of completed surveys. Interacting directly with our target audience also gave us feedback that the invitation to our survey was not easily accessible. This allowed us to re-evaluate our method and take note for future communication plans.

The survey and focus groups both indicated that prompting individuals before printing jobs could influence their printing habits. For example, programming a pop-up window before all print jobs that display "Are you sure you NEED to print this?" This would remind individuals that not all documents

need to be printed. Key reminders of best practices relating to printing paper would also help shape printing behaviours on campus. Using electronic communication methods and avoiding printing emails would reduce the volume of printed paper on campus.

All RRU computers have a default setting to print documents double-sided, which is excellent for reducing the number of pages being printed. Though this setting contributes to our printing pages reduction campaign, it is important to note the disadvantages of this setting. The general opinion of our focus groups was that double-sided documents are unprofessional, and that some schools only accept single-sided reports and assignments. In certain situations, documents are unintentionally printed double-sided and as a result, must be re-printed single-sided. This situation results in individuals printing a higher amount of pages than otherwise intended. Having prompts appear before the printing job is executed would be beneficial as a reminder to the individual that the function is set to double-sided, and supports our campaign by asking them if the print job is necessary, or if it could possibly be avoided.

Though staff and faculty have no incentives to reduce their paper consumption, it's important to take into consideration the positive effects of charging students has on the number of pages they print. Similar to staff and faculty that must print documents as part of their job description, students must also print assignments, notes and study tools. If staff and faculty were limited to the number of pages they are permitted to print as per their job description, they may be more conscious when printing documents for themselves or students. If staff and faculty were to surpass these limits, they would be contacted by their manager to find out why this limit has been breached.

#### **4.5.5 Preventing Printing**

Printing documents can be avoided by simply keeping them in an online or electronic format. This allows individuals to carry many documents at the same time, while reducing the possibility of losing documents. Electronic testing methods, emailing class notes, assignments and memos, using USB flash drives, and using online storage are all ways that information can be stored and shared through electronic methods.

The Z: drive is available on all school computers increasing the convenience of sharing documents with co-workers without having the need to print documents. It stores all documents electronically and can be accessed anywhere on campus. With this simple sharing method, keeping documents electronic should be simplified for staff and faculty. The university email also has ample storage space that allows staff and faculty to save their emails for a prolonged period. This avoids the need to print in order to free email storage space.

With the continuous improvements in technology, converting to these methods would be advantageous. On the other hand, allowing employees to use their personal tablets (iPads) could result in a possible breach of security, or confidentiality of RRU information. Thus, although these improvements in technology could be beneficial for individuals in the workplace, these tools would have to be provided by RRU and be considered RRU property.

#### **4.5.6 Reusing and Recycling Paper**

Through our survey and focus groups, we discovered that many individuals find themselves printing documents for personal purposes rather than important work-related documents. It is understandable that a large number of individuals work better by having hard copies of documents in front of them. In order to modify our approach with these individuals, while maintaining the aim of reducing their carbon footprint, we suggest the setup of used document folders, where people can place their used paper so it can be re-used later. This folder will hold past print jobs that were faulty or simply didn't take up both sides of the pages, and the opposite side can be used for note taking, or personal message printing. Having this folder maximizes the use of paper, after which it can be recycled by staff and faculty. Prompts appearing above printers will serve to remind individuals to recycle their document once it has served its purpose. Recycling bins will need to be more abundant in offices and in easily accessible areas such as near printer, at every desk, and between cubicles.

#### **4.5.7 Reducing Printing**

The electronic methods of document handling, described above, avoid printing unless it is necessary. They also encourage a reduction on document size, by ensuring that the text and images use up the majority of the page. Formatting modifications such as changing the margins, using single-spacing, and a small font size, could also significantly reduce the number of pages in documents. For example, by simply changing the margins of documents, the available printing space increases from 63% with a 1 inch margin, to 80% with a 0.5 inch margin (Sarantis, 2002).

Motivations for creating documents, while considering these formatting changes, could range from personal goals to conforming to the social norms of one's department or RRU as a whole. Allowing modifications with certain documents would give staff and faculty the opportunity to participate in reducing paper usage, and encourage them to make a difference, no matter how small. This would give all staff and faculty a chance to bring new ideas forward with regards to formatting and reducing paper usage, knowing that they would be able to test them out if feasible. Observing colleagues participating in these initiatives may motivate those individuals who are less inclined to reduce paper consumption.

## **4.6 CONCLUSION AND RECOMMENDATIONS**

The use of an online survey was found to be an effective tool for gathering information. Personal contact aided us in achieving verbal commitment increased the number of completed surveys. This resulted in an impressive level of participation in the survey overall yet staff made up the vast majority of the participants. For individuals who are frequent printers we found that switching to paperless technology would be beneficial, yet those that print somewhat less may be better off continuing to use the printer sparingly. It was also found that some positions within the university require higher levels of printing, while some people print because they are required to print for others. Paperless systems are being developed within the university in order to reduce printing. We recommend that paper reduction strategies such as prompting before and after printing and increasing the storage in university servers should be used to promote these systems.

Interacting directly with our target audience also gave us feedback that the invitation to our survey was not easily accessible through Crossroads. This provides useful information that Crossroads serves as a better tool for reinforcing messages which are sent via other primary methods of communication.

It was explained in the focus group that most single-sided printing was used for professional and confidential documents. Members of the focus group identified faculty as the highest printing offenders; however, it should be noted that the focus groups may have been biased due to only staff attending.

The data shows that since 2011, RRU has decreased the amount of printing on campus. Printer 5278 was found to be the most used printer on campus over the past two years, averaging 82 sides per hour based on a 2080 hour work year. It is recommended that this printer be located and the reason for its high level of use be remediated. The top three print accounts represent over 10% of the total printing on campus. We recommend that these people be contacted directly to discuss special accommodations that could be made to reduce their printing. To see a significant change in printing totals similar to the drop in 2012, a major shift to electronic systems is required.

## **5 PROJECT CONTINUATION RECOMMENDATIONS**

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Since the beginning of this project there have been temporary issues with initiation requirements, communication, and information gathering. These hurdles were overcome, yet represent something that could be streamlined for the continuation of sustainability at RRU. These opportunities for improvement encompass administrative, project and team adjustments.

Initially, the ethical review process delayed the project, and restricted our access to certain information. Defining the project in greater detail, such as the scope and objectives, before filling out the ethical review would have decreased the amount of time required for approval. Advisor and sponsor should clearly communicate these details before the selection of teams and creation of project outlines. For the future, staff and faculty roles should be provided to the students prior to the ethical review process in order to inform the students of the resources available to them.

As a team, we could have made a number of decisions and choices differently that may have improved the accuracy and efficiency of the project. The delivery methods of our communications were inadequate in areas of privacy, particularly access of personal information and disclosure of intentions. Our communications, which consisted of an online survey, Crossroads articles, emails, and personal visits, should have been more informative. By doing this, the staff and faculty would understand our project objectives from the beginning, and lead to greater engagement on their behalf. This would have likely given us better survey results, higher attendance at focus groups, and more input from all departments and schools at the university.

A number of other factors detracted from our efficiency throughout the project. We were fortunate enough to be able to work closely with a number of influential employees. We felt that asking these busy people to donate large quantities of time required to interview specific print users was unrealistic allocation of their time. In future, we would like to have a staff member at our disposal not bound to the limits of our ethical review that can serve as a more full-time liaison with specific print users. This liaison would also have been able to access data that was limited to us which would have been useful when analyzing the print account spreadsheets, which identify staff and faculty that are contracted, part-time, or no longer work at RRU. This would have allowed us to be more accurate and would have likely given better understanding to certain trends in the data.

This project is based off of community partnership and participation; that being said, it is recommended that staff cooperate with students regarding projects that are directly related to the university. Having influential people at RRU inform others about our objectives, it is likely that they would have been more willing to cooperate in our goal to reduce paper use and GHG emissions. If it was

made mandatory for at least the department and school managers to speak with us, this would have helped the project greatly, and would have led to greater reductions.

## **6 ACKNOWLEDGMENTS**

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The successes of this project would not have been possible without the generous contributions of time and expertise from many people. We would like to extend our sincere gratitude to the following people for their contributions.

Peter Anttila – Compiling print data and offering expert advice on data manipulation.

Gina Armellino – Reviewing and advising on ethics.

Moshi Charnell – Assisting with planning for data organization and developing framework for the project.

Cecelia David – Aiding with data acquisition and manipulation as well as communications with staff and faculty.

Fred Havekotte – Providing information regarding infrastructure and consumable resources.

Rick Kool – Reviewing and advising on ethics as well as providing many hours of guidance.

Charles Krusekopf – Teaching the foundations of CBSM strategies as well as providing project assistance information on staff and faculty behaviour regarding paper data.

Alison Moran – Providing oversight and direction on the project as a whole and working closely with the team throughout the year to assist in the development of the project.

Kathie Snell – Publishing Crossroads newsletters and facilitating communication with staff and faculty.

Nancy Wilkin – Managing project goals and providing invaluable expertise in sustainability initiatives.

Also, donating large amounts of personal time to our project as well as directing influence within the university to facilitate widespread cooperation among all parties.

Jenna Williamson – Contributing constant support and advice regarding the project.



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## 8 APPENDIX A: ENERGY CONSUMPTION ANALYSIS

The following table shows the energy consumption (electricity and gas) for the main buildings on campus. Fred Havekotte manually recorded the data throughout the months of February and March 2014. The data was analyzed by CMS and the values below demonstrate the energy consumption values ( $\text{m}^3$  for gas and kWh for electricity) compared to surface area of the buildings ( $\text{m}^2$ ). The buildings have been ranked from most energy consumed to least.

Ranking	Gas Consumption ( $\text{m}^3/\text{m}^2$ )	Ranking	Electricity Consumption (kWh/ $\text{m}^2$ )
Recreation Center	2.40	Learning Research Center	9.06
Learning Resource Center	2.22	Grant Building	6.21
Grant Building	1.44	Learning Innovation Center	4.07
Hatley Castle	0.73	Hatley Castle	2.68
Learning Innovation Center	0.54	Recreation Center	1.32

## 9 APPENDIX B: EMAIL RESPONSES

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What a great research project! Still, there must be a mistake. There is no way, with the little I print and the times of absences I had since January, that the figure is correct. Maybe, the research group would like into how the sheets of papers are counted and whether there might be room for error (just to make sure that the research is accurate).

Thank you for the stats below for my printing usage. It appears that over three months, I printed approximately 200 sheets more than average. It is important for your team to note that in my position as manager, I frequently am producing and distributing information on behalf of all of our school members (14), which does impact on my printing stats.

I want to assure you that wherever possible, I print two pages per side on a sheet (4 pages) and reduce margins to minimum. And while much of our materials are distributed electronically, it must be noted that reading comprehension rates are substantially lower for electronic text than in printed form. So for much of the materials I must proofread, for example, printing is best. Also, when reviewing spreadsheet data for decision-making, it is frequently much easier to view in printed form, is portable, and does not require copious multi-directional scrolling to read data. The above are some of the reasons my printing stats are higher, but besides all that, I am pleased that this monitoring and suggestions are happening. Thank you so much for your message and great initiative.

You are right, I am probably printing much more than the average colleagues given my transition between roles at RRU. Nonetheless, by being aware of the impact I can better manage my needs in the future. This is my commitment to you (and me) to reduce my printing at least closer to the average and lower if possible. My gratitude for your friendly suggestion and great project

Thanks all. This is good to know. Great work and suggestions! I will definitely utilize some of the tips that you have provided. Best of luck with your final project!

Yes, we do know that in Continuing Studies we (and each one of us individually if we are tasked with the job of printing handouts) print more than many departments as we are

responsible for the public students who don't all have access to computers and cannot as easily download documents required for learning. It is a rub for us and while we measure annually our sustainability through many aspects of awareness and action, printing is definitely always on the radar. We had reduced our printing in subsequent years *as a team* and this year we had a blip upward which we are vigilant about and are looking at more critically. Thank you for your reminder and the work you are doing on behalf of RRU.

Very useful. I look forward to seeing an update that will reflect the changes in our processes. PS – Your text mentions this covers Jan-Apr, but the chart mentions Jan-May (not that it matters to me, as it is still too much printing).

Thanks very much this is great information I will bring it to the team and see what can be done. This is great information thank you so much for all of your work.

Because of my job role in recruitment I have to print documents/contracts for signing and I manage a large budget with multiple invoices. I do try my best to do as much electronically but because of the nature of my role I cannot avoid the bulk of the printing. I will ensure I am mindful at all times of my usage.

As part of the data for your project, I thought it worth mentioning that the Registrar's Office is the repository for a lot of records that require printing for inclusion in student files, etc. That could be why my print totals are a lot higher than my peers. I'm curious to know who I'm being compared to: the University in general or my peers in the Registrar's Office?

Please note that, as far as we have been told, the print statistics do not reflect pages used, but rather *sides* of paper used. i.e. One sheet of paper printed on both sides is counted the same way as 2 sheets of paper printed on 1 side each.

## 10 APPENDIX C: SURVEY RESULTS

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1. What describes your role at RRU best?

RRU Staff	55
RRU Faculty	7
Other	1

2. Please select your appropriate age range

21-30	8
31-40	14
41-50	23
51-60	16
60+	4
Choose not to respond	3

3. How many years have you worked at RRU?

Less than 1 year	4
1-3 years	12
3-5 years	7
5-10 years	21
10+ years	19

4. Do you sort your waste in order to redirect it from reaching the landfill?

Always (100% of the time)	32
Most of the time (80% of the time)	29

Half the time (50% of the time)	2
Occasionally (20% of the time)	0
Never	0

5. Do you use a space heater in your office during the winter months?

Always (100% of the time)	5
Most of the time (80% of the time)	5
Half the time (50% of the time)	9
Occasionally (20% of the time)	4
Never	39

6. Do you turn the lights off when you leave a room while at work?

Always (100% of the time)	24
Most of the time (80% of the time)	22
Half the time (50% of the time)	5
Occasionally (20% of the time)	7
Never	4

7. Do you turn off your computer when you leave work for the day?

Always (100% of the time)	13
Most of the time (80% of the time)	5
Half the time (50% of the time)	2
Occasionally (20% of the time)	10
Never	32

8. On average, how many pages per day do you print at RRU?

0-10 pages	37
11-20 pages	15
21-30 pages	4
31-40 pages	2
40+ pages	4

9. How often do you change the “print double-sided” function to “print single-sided” when printing documents?

Always (100% of the time)	4
Most of the time (80% of the time)	7
Half the time (50% of the time)	4
Occasionally (20% of the time)	31
Never	17

10. By what percentage do you think you could easily reduce your paper waste?

100% reduction	0
80% reduction	1
60% reduction	2
40% reduction	5
20% reduction	35
No reduction	20

11. On average, what best describes your printing responsibilities?

I delegate a large amount of printing	1
I delegate some printing to others	0
I print the jobs which I need personally	40
I do some printing for others	13
I do a large amount of printing for others	9

12. Do you ever use the reverse side for printed documents that are no longer of use?

Always (100% of the time)	3
Most of the time (80% of the time)	9
Half the time (50% of the time)	11
Occasionally (20% of the time)	24
Never	16

13. Do you recycle your printing paper when you've finished printing?

Always (100% of the time)	54
Most of the time (80% of the time)	3
Half the time (50% of the time)	1
Occasionally (20% of the time)	4
Never	1

14. How often do you print emails?

Always (100% of the time)	0
Most of the time (80% of the time)	2
Half the time (50% of the time)	2



Occasionally (20% of the time)	46
Never	13

15. How often do you print in color?

Always (100% of the time)	0
Most of the time (80% of the time)	0
Half the time (50% of the time)	2
Occasionally (20% of the time)	42
Never	19

16. What percentage of printing would you be willing to reduce by adopting paper free practices?

100%	1
80%	5
60%	7
40%	7
20%	25
None	17

17. Please briefly describe any barriers you face regarding reducing paper usage or going paper free.

Editing work is best done on hard copy. Some documents get buried in email inboxes and must be printed for others.
Needing to print class materials; needing to bring things to meetings; needing to post notices in classrooms e.g. schedules.
I like to mark up documents for editing and it's easier for me to do if I can physically write on

it. While there are online markup tools, I don't like using them as I don't find them as good as the "old fashioned" way.
I meet with prospective students in an area that does not have a computer
I've an iPhone but would need something larger (e.g. tablet) in order to replace most of my printing. What I print is not only used for reference but note taking as well.
Complicated to synch a tablet and work computer; printing makes items more portable, easier to read and reference later; no cost to printing
ease of referencing information at my desk
Our group is already working on one of the challenges which has to do with how we organize the files we need to work. One of the reasons I print something off is because I fear I may never see it again. That is, I have been the 'victim' of files being reorganized and what I need deleted, or put in a place I would never think to look. We use about 5 different systems (SharePoint, Google docs, the O drive, etc., our personal computers, email, the CS knowledge base, a site in Moodle) to store files we need to access regularly.
Often not an option to not attach documentation to accounting entries
lack of on-line technology forces paper usage, need it for efficient/effective record keeping
The amount of paper printed for instructional purposes or support at meetings.
The university gives us paper, it doesn't give us tablets...
I am sometimes asked to print documents on behalf of faculty as part of my job.
assignment marking/comments on paper is far much easier than on a electronically submitted document
Sometimes I find myself printing documents when I'm cross-referencing with another document. This could be reduced if I had a second monitor at my workstation.
It's impossible to proofread a document to the required standard on the screen
Our current credit card procedure requires printing paper copies of some documents.
I have 12-14 page workbooks for each of my clients that I print and place in the file to stay up-

to-date on their details. When I meet with them on site I need this hard copy.
I don't have a laptop. Some reports need to be printed to be processed.
I don't have a tablet or other portable device.
When I meet clients on site I have to have a printed document of their event with me to go over.
Don't have a tablet or similar easily transported device. Reports and other large documents often are easier to read and edit in hard copy. Also, I regularly refer to the paper files I have, where everything is accessible.
There are still a lot of things that need to be printed - i.e., Invoices, contracts and such have to go to finance; articulation agreements need to be printed out to be signed and sent to partnering institutions; and going to a meeting organized with all the data (especially if using spreadsheets and multi documents) need to be printed out for ease of reference and taking notes. We will do not have an easy way to do electronic signatures.
Much of my printing is program information and is done for meetings with prospective students.
The biggest reason for my printing is reports to be distributed to others.
Reading longer articles that I need to highlight, underline or take notes on is hard if I don't print them.
Others who request that I print documents that I think can be viewed onscreen. The cost of obtaining tablets to further reduce usage is highly unlikely.
Most of our printing deals with certificates, tentcards, class check-ins, evaluations and course materials for our courses so I don't see how those can be reduced. Once our website is revamped I could see reducing more paper usage for registrations.
I frequently cross-reference multiple documents which may contain hand-written notes as well - it's too inefficient to not have them printed (I'd need 12 tablets!)
Print to paper media as easier to analyse and audit data versus on the computer screen.
Habit. I find it easier to read, highlight, and make notes on paper documents, even though I

know that features exist that would let me do those things electronically.
Most of my printing is due to needing approvals on contracts, student forms, etc. If those processes were to be automated, it would reduce my printing by quite a bit.
Using multiple programs requires printing to compare to others - dual monitors would assist however not available at this time
If there is a document such as a course outline or policy to read and remember it is easy for me to do in hard copy format
prefer to print calendars (for others) as visual reference for tracking changes
I don't own a suitable portable device
I have limited control as I print for others
I print documents for students so unless they stopped requesting the documents then my paper usage will stay the same :)
I am already using an iPad for meeting notes and documents, I mark electronically and only print when necessary.
I don't have a tablet to use to take minutes or notes at work. I use a note pad.
the nature of my current job requires a large amount of printing for archival purposes so until we move to another system I will have to continue printing at this volume
I can't reuse paper because the printer I use is shared and far from my desk. Someone else could easily end up printing on my paper
Easily sharing with co-workers (ie - do they all have compatible 'devices'.)
Keeping track of the many, many tasks and their priorities. Sometimes it is easier to have a printed reminder.
Current Student Filing system (eg admissions and registration) all paper. Would need major overhaul (I think it needs this). Would need electronic Signatures
Some documents don't lend themselves well to accessing/reading/editing on a tablet (I have an iPhone already). Signals on campus are intermittent as well. I find it easier to read certain

things hardcopy, make notes, highlight information, etc. I also take work home often and have difficulty accessing our server from a mac. I should say it's also a lot lighter/easier to carry one sheet of paper to a meeting across campus than carry an iPad around everywhere.
A lot of documents require signing on hard copies which has no alternate solution to make it paperless. That I think is the biggest barrier.
Confidential documents cannot be reused as scrap and color printing is used for official documents
Our office has gone through a considerable paper use cut about a year ago. We now print out information that needs to be retained due to the nature of our role at RRU. We print out the basic and important minimum, the rest is kept in e-format.
I print all the online parking applications for both students and staff for processing at Security, as well as telephone directories for switchboard services, and many other student documents.
Students write on the worksheets I provide for them.

18. Please describe any incentives that you can think of that would help motivate you to further reduce your printing and paper use.

I would happily reduce more of my printing if there was a way to bring things to meetings easily or if instructors would allow more of their course materials to be electronic copies only.
I don't know. But regarding your earlier question about turning off the computer at the end of the day -- on campus we are discouraged to do so as updates run overnight. They prefer we leave our machines logged off.
Re: question #7 - We have been instructed NOT to turn off our computers as they are updated overnight. I log off and sometime over night the computer goes into sleep mode.
Allowing us to retain more than two months of emails in our inbox. I will sometimes print emails so I don't forget to work on them. I'd use tasks or reminders but there are just far too many for that to be an effective alternative.
Department focus on printing less; rewards for departments that print less

Work issued laptop I could take to meetings.
1) Increase the 160 mg limit of our email storage. Although I can download files to store on my computer, I don't have a way to do this easily with emails. I find myself printing important emails off because I need to regularly delete batches of messages because of our cap of 160 mg. Why does google's gmail let me keep 5000 messages (many with huge image files attached)? It doesn't make sense. Most people in my group regularly complain about this constraint. (2) Better vision plan in our benefits: As I age, my eyesight will not adjust to the different focal lengths I need. I find I need 1 pair of glasses for distance (to drive and generally walk around), 1 pair for reading (or up close phone and tablet use), and 1 pair for the distance to view and read off of a computer screen (on my desk). Our vision plan allows us to purchase one pair of new glasses every two years. So I usually need to replace either the distance or reading glasses, and thus need to print off a long dense email or word file in order to read it comfortably.
none
I'm not sure as most of the printing I do is still considered necessary.
Not sure I could print any less in my current job.
Retirement :)
A different credit card provider that has online access to account information (this is in the works)
Just knowing what impact we have is enough to motivate me. I'm very selective on what I print because of this. Perhaps a challenge within our department would keep others conscious of this, as we do have offenders in our office that could do better!
Seeing each year my paper printing going down (actual numbers). Knowing that the university is saving money.
I don't need the motivation... I would love to print less. The need currently exists for the reports to be printed for distribution at meetings.
I am already quite paperless - might be able to cut back a little (less than 20%) - but I work at

it AND I am really good at recycling!
I find that getting the printing stats from IT keeps me aware of printing habits and how much I still need to improve.
I'm judicious about my printing, can't really think of an incentive not to
Having multiple monitors increases the available workspace to compare data between screens reducing the need to print.
Friendly reminders of best practices would be helpful.
dual monitor
I would be hard pressed to further easily reduce my printing.
moving to an electronic storage/file share system
I get an email every year outlining my paper use. That's useful. But overall I try to be careful with my printing. I print some emails and occasionally print something in colour, but very little of both, less than 20% although I did select 20% in the survey question.
'Apps' for devices - paid for so we all have same version
Staff with iPads at meetings
free coffee for people who reduce usage by X amount
Committee meetings with enormous packages could be projected - or referred to on tablets. Members can make notes on notebooks.
Perhaps some sort of inter-departmental competition to award the department that uses the least amount of printed papers.
I don't know how I can reduce the printing when most of the time the printing is done for others
The stats we receive every year from the computer services in re: how much paper has been used is a great motivator to think before print.
I could ask students to copy the questions from the screen.

## 11 APPENDIX D: 2013 PRINTING DATA & GRAPHS

5500-6499					
Sum of # Pages Printed					
	Qtr1	Qtr2	Qtr3	Qtr4	Grand Total
Account ID					
11094	3630	2836			6466
6004	1622	1294	2421	1122	6459
11779	3172	2129	1067		6368
6980	1353	1387	1925	1627	6292
13106	3562	753	622	1145	6082
5543	1125	1477	2006	1409	6017
5606	2646	1053	1832	477	6008
5725	1527	1834	1567	1069	5997
5460	1907	1676	1487	919	5989
13771	762	1264	3116	790	5932
5760	1142	2769	1080	868	5859
8918	1333	1053	1802	1602	5790
5659	1666	1221	1524	1324	5735
5542	1518	1671	1010	1535	5734
15391	2046	2112	1561		5719
13975	468	2079	2126	1023	5696
11891	2313	1247	1016	1118	5694
14226	845	2526	884	1349	5604
5679	1686	1498	1506	886	5576
13927	845	1690	1721	1300	5556
15292	1415	1416	2172	541	5544



6500-7999

Sum of # Pages Printed					
	Qtr1	Qtr2	Qtr3	Qtr4	Grand Total
Account ID					
16085	1137	2426	2545	1866	7974
5215	4922	1547	767	605	7841
5454	1401	1907	2199	2168	7675
5477	1364	578	1122	4432	7496
5619	2602	3633	1151		7386
5206	1646	2555	1285	1869	7355
15475	2281	1736	2143	1159	7319
17874			646	6522	7168
8173	125	645	445	5949	7164
5663	1880	2035	1814	1405	7134
15547	1660	2546	926	1890	7022
14654	2036	1598	1712	1630	6976
15479	2505	1889	1488	1044	6926
5560	2062	2553	1592	690	6897
6142	1849	1757	1667	1614	6887
5842	2531	1523	1165	1563	6782
16675		1057	3265	2348	6670
6670	1490	1850	2121	1133	6594
5299	1164	1537	1720	2135	6556
13683	1767	1411	2095	1268	6541
6628	1508	1922	1364	1729	6523

8000-9499

Sum of # Pages Printed					
	Qtr1	Qtr2	Qtr3	Qtr4	Grand Total
Account ID					
16273	4267	2031	1534	1604	9436
5209	2542	3129	2230	1375	9276
5789	3828	4098	814	527	9267
10133	2725	4148	2323	8	9204
13186	2907	2944	1633	1657	9141
13238	2055	5225	1075	757	9112
11495	1182	1924	2975	3009	9090
5976	518	7504	625	254	8901
7321	549	2766	474	4954	8743
5701	2529	2735	2034	1408	8706
10521	1939	2854	1830	1890	8513
7258	1706	219	1210	5371	8506
5458	2888	2645	2883		8416
16335	357	2707	2472	2729	8265
7782	1989	2094	1939	2195	8217
9763	2135	2126	2100	1811	8172
13216	1859	1148	2193	2970	8170
5591	1585	2912	2107	1544	8148
15024	1360	1571	2608	2577	8116
5710	2526	2084	2189	1282	8081
12681	2577	1944	1595	1930	8046
5456	723	5251	593	1473	8040

*The Introduction of the CCP and Paper Reduction Campaign*

9500-15999

Sum of # Pages Printed					
	Qtr1	Qtr2	Qtr3	Qtr4	Grand Total
Account ID					
14687	4386	3755	3353	4137	15631
8914	2383	4453	4678	4106	15620
5524	3381	4281	3147	4653	15462
5575	1672	7183	1928	4495	15278
17800			4349	10839	15188
5588	4626	3766	2828	3804	15024
5451	3919	1681	6679	2311	14590
5391	4964	3607	2588	3057	14216
14769		388	6628	7196	14212
9257	2902	3335	4872	2744	13853
7040	2323	3676	3879	3896	13774
15976	3363	3541	2203	4059	13166
5743	4232	3454	4520	655	12861
5531	2987	4674	2957	2210	12828
14134	2823	4190	3369	2152	12534
9154	3105	3003	4696	1497	12301
11379	1930	2698	2286	5282	12196
7582	7242	1350	1580	1958	12130
9779	2760	3553	3359	2028	11700
5438	3643	3900	1646	2453	11642
5207	2480	3074	2914	3088	11556
5510	2573	3091	2645	3057	11366
10860	4212	625	5240	1101	11178
13366	2267	4122	3232	1433	11054
16535		3394	4053	3283	10730
3658	3427	2202	1833	3191	10653
5516	5741	2873	961	1078	10653
13481	1158	9194	269		10621
6452	1723	5680	59	2976	10438
15397	2987	6434	464	422	10307

16225	2051	2742	2045	3260	10098
5773	1089	5293	1357	2355	10094
7465	3080	3160	2149	1605	9994
5788	2855	2445	1829	2791	9920
13121	1920	2335	2552	3029	9836
7992	1274	2649	2748	3122	9793
14808	544	3806	1824	3438	9612
5657	2343	2537	3054	1577	9511

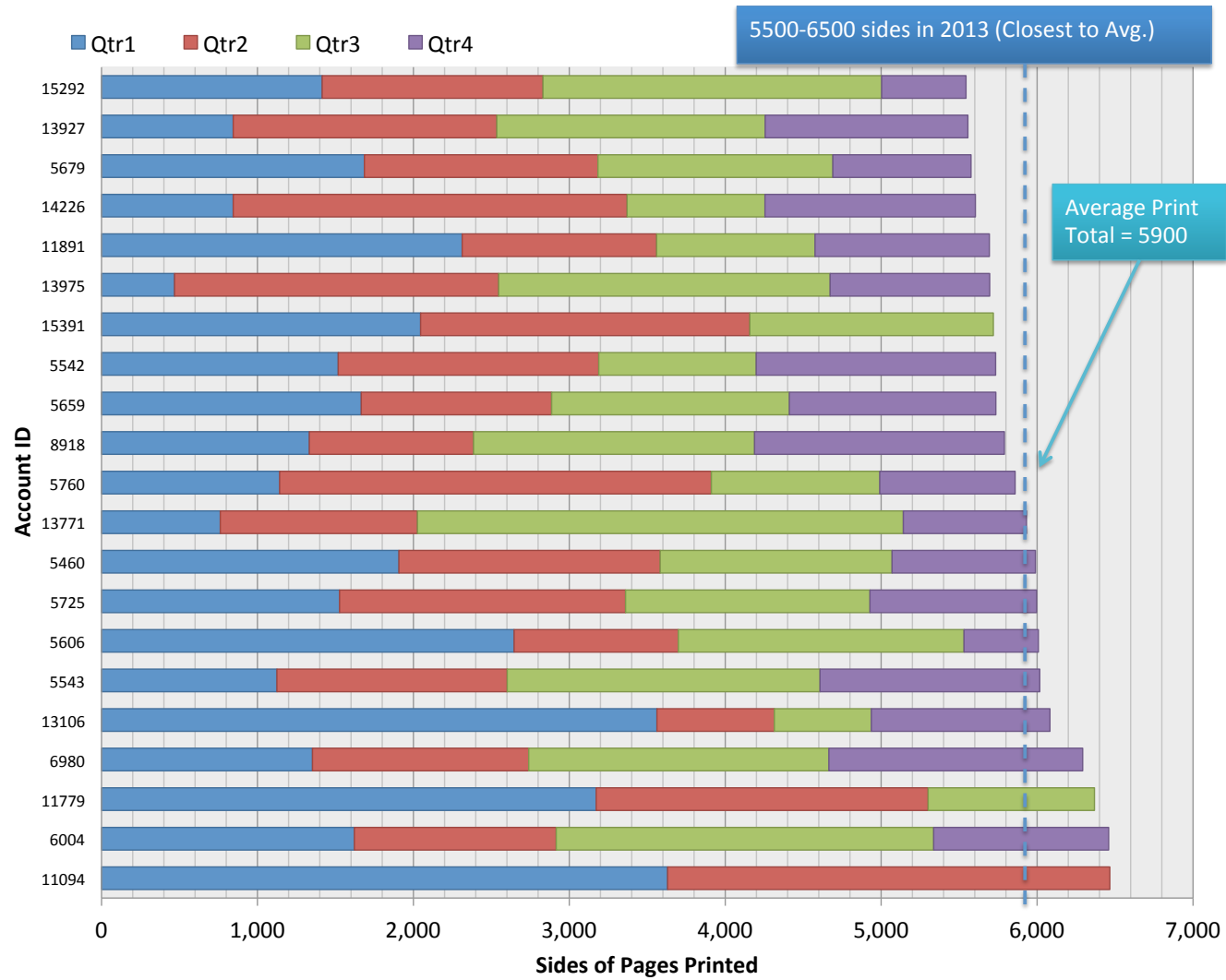
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Sum of # Pages Printed					
	Qtr1	Qtr2	Qtr3	Qtr4	Grand Total
Account ID					
16384	52	33710	12302	24626	70690
5664	28245	19972	6030	10640	64887
11853	14298	11782	15254	902	42236
5551	14459	8515	9755	3902	36631
15616	15673	5316	5050	9730	35769
5582	8487	8025	6830	8178	31520
7406	15259	5756	3766	4195	28976
14030	3670	12715	5757	6535	28677
7641	4879	5570	10309	6762	27520
5545	3961	7252	5827	6573	23613
5213	5097	4499	2560	6834	18990
14927	6004	3135	7100	2234	18473
5290	4721	5541	4869	3192	18323
5768	3135	6202	4997	3053	17387
5478	5525	4355	2990	3594	16464
12822	4344	4384	3096	4338	16162

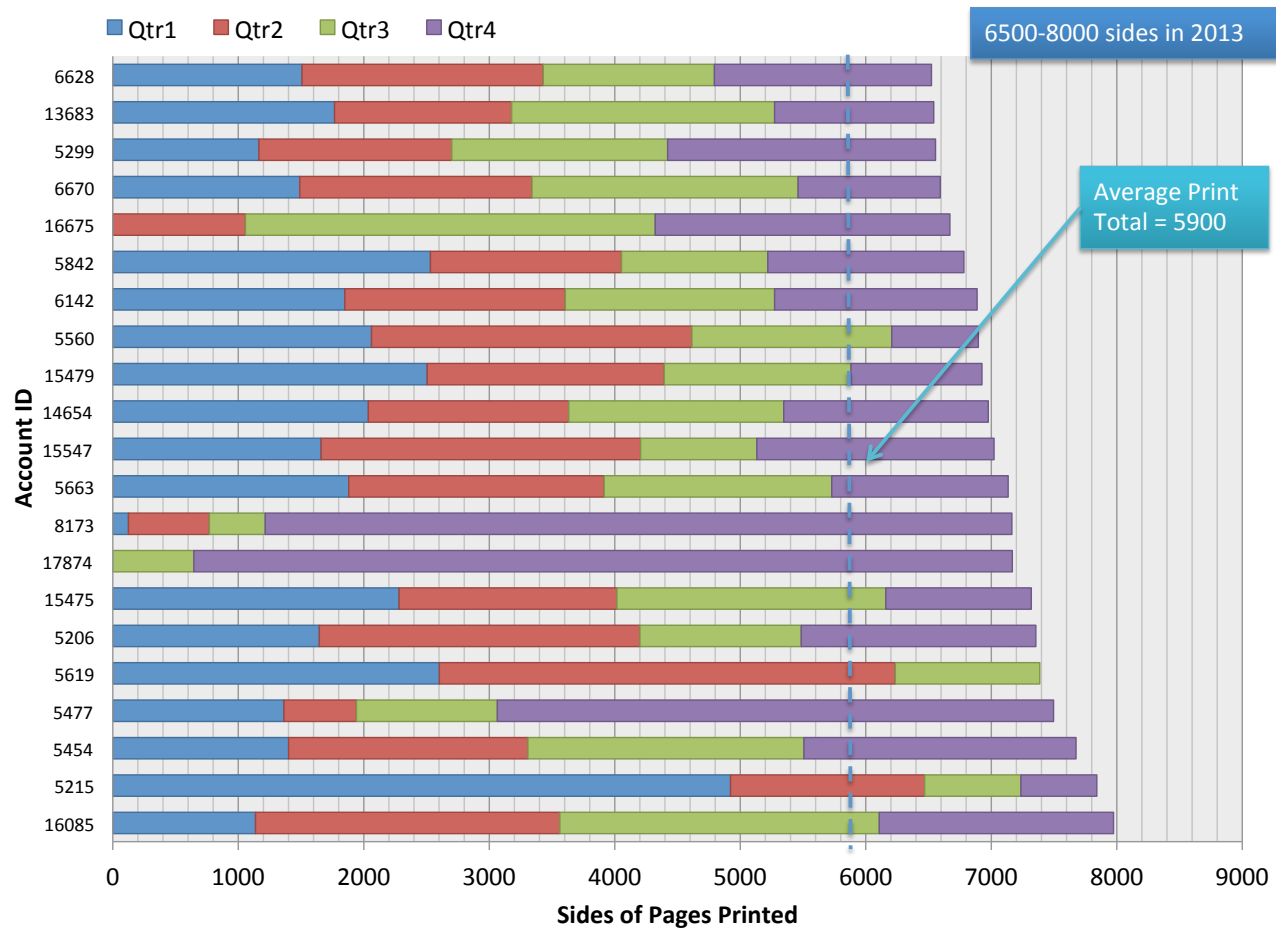
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Printer ID	Qtr1	Qtr2	Qtr3	Qtr4	Grand Total
5278	45767	44892	29918	50483	171060
5350	33501	28933	23896	24041	110371
5291	27846	20764	19223	26560	94393
5170	30766	17375	15270	16137	79548
12028	12075	21354	15814	26589	75832
5364	15009	21020	18869	15473	70371
5338	21617	20426	13670	8313	64026
5272	16337	15615	13339	16914	62205
5340	11674	21591	13669	12665	59599
5183	13506	17999	12560	13927	57992
7967	13717	13883	15855	11734	55189
5368	14508	17294	12813	8700	53315
11254	12576	14844	12035	10167	49622
5505	10935	12224	12076	13841	49076
5521	15306	12620	10441	9082	47449
5372	11140	11476	11542	10239	44397
5280	9775	12357	9869	9303	41304
5284	10926	10371	9650	9615	40562
12023	1861	23662	11871	1960	39354
5288	10573	12256	7720	8429	38978
5179	10671	11673	12759	3509	38612
5370	10098	9345	10896	8177	38516
5346	6089	21047	4328	5766	37230
5187	8796	10347	9057	8383	36583
5306	10603	9390	9995	6290	36278
5268	9454	7964	10285	8231	35934

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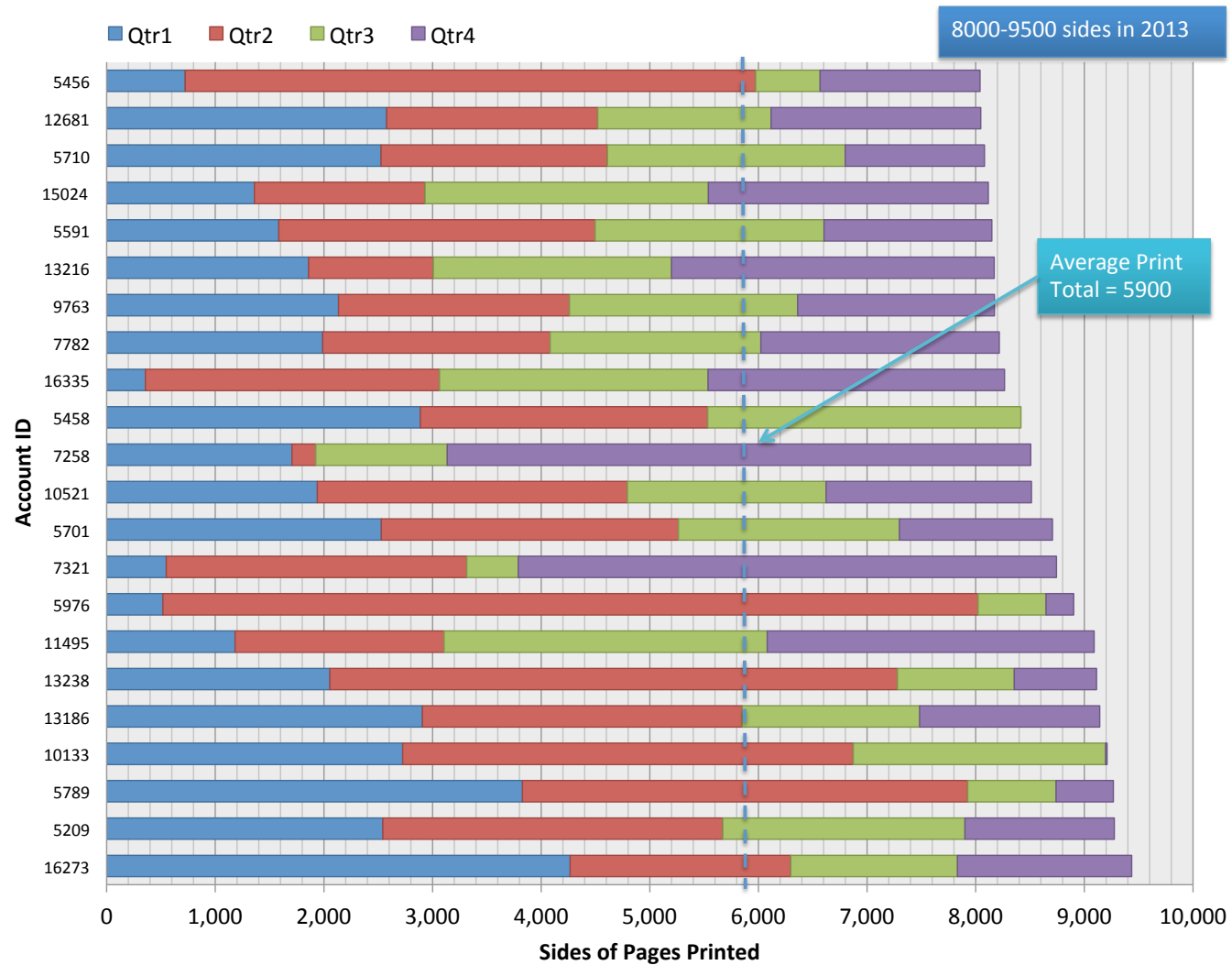


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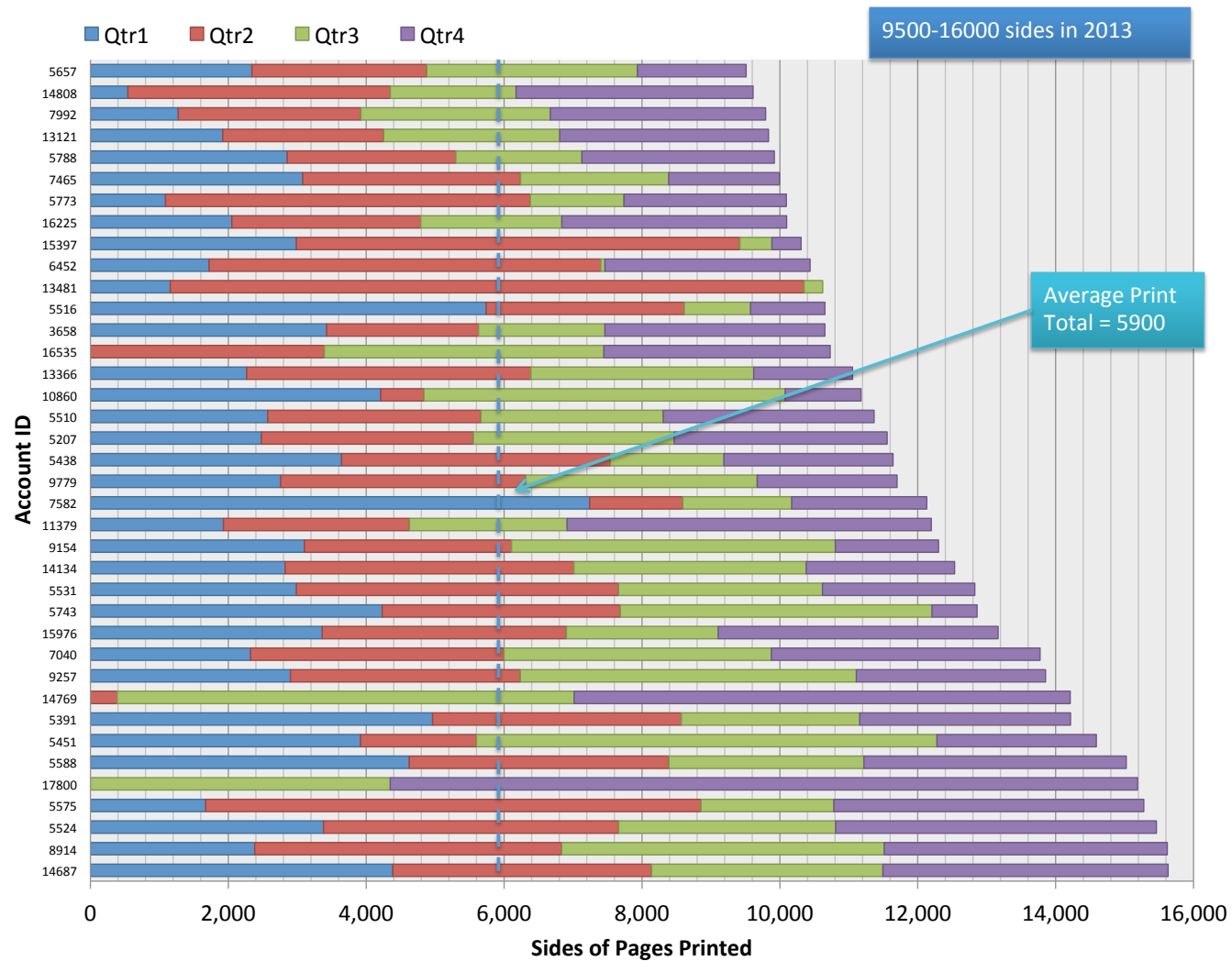




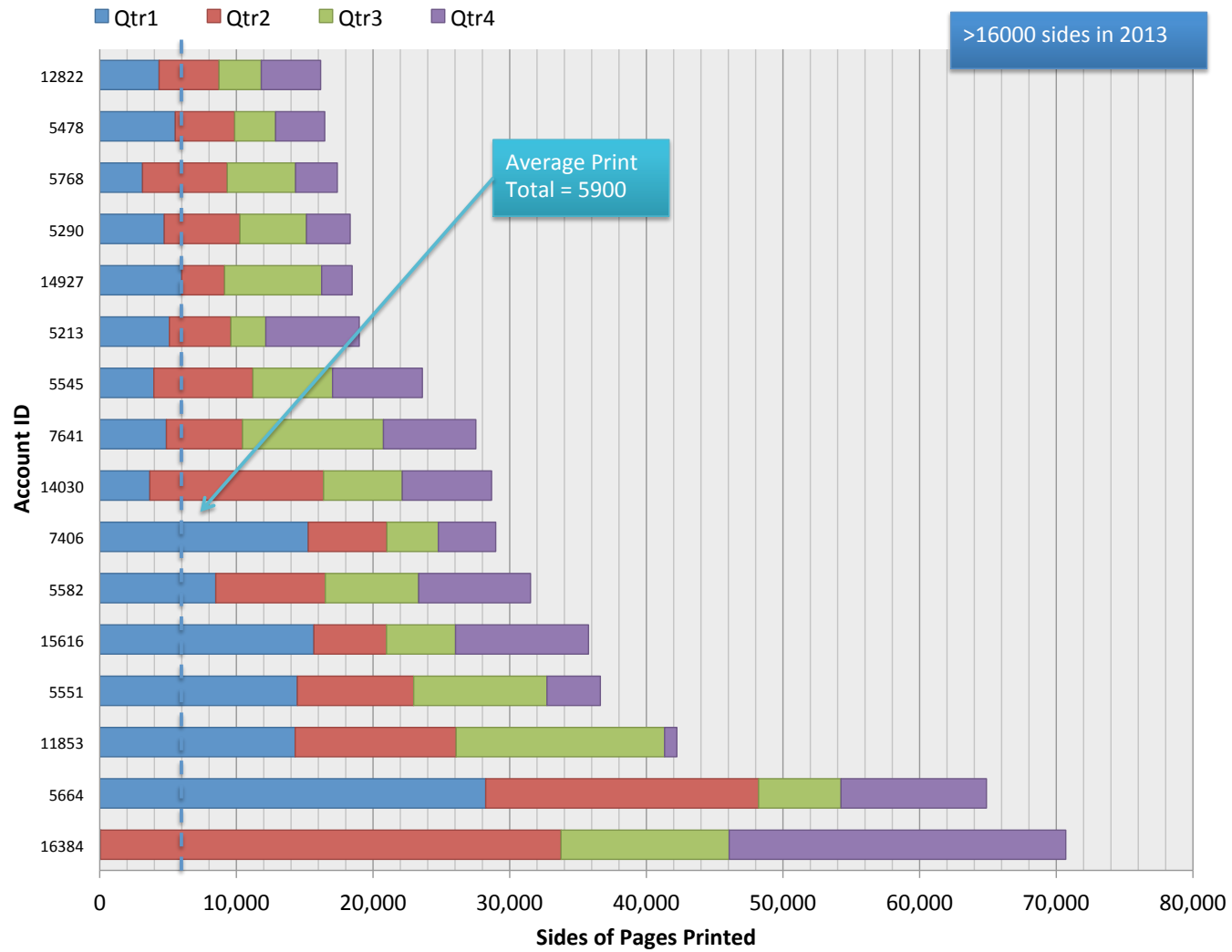
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*The Introduction of the CCP and Paper Reduction Campaign*



*The Introduction of the CCP and Paper Reduction Campaign*



## 12 APPENDIX E: 2014 PRINTING DATA & GRAPHS

2300-2699							
Sum of # Pages Printed							
	Jan	Feb	Mar	Apr	May	Jun	Grand Total
Account ID							
15660	641	227	1012	273	242	293	2688
3614	167	251	85	696	817	664	2680
5526	690	473	499	374	281	354	2671
5451	535	509	903	194	424	100	2665
7659	821	309	374	686	416	57	2663
5682	223	380	700	235	606	504	2648
5771	649	106	422	335	794	336	2642
5706	238	292	183	798	655	432	2598
17633	696	396	514	334	375	280	2595
5456	155	46	313	178	841	1062	2595
10957	454	414	636	312	186	590	2592
16585	237	464	833	531	277	247	2589
18918	94	386	227	1217	481	153	2558
14226	448	248	638	396	265	549	2544
17873	356	246	344	337	645	594	2522
5542	385	605	387	389	426	329	2521
11119	212	76	388	1124	216	475	2491
12771	502	244	629	445	133	522	2475
5702	400	227	678	315	609	244	2473
13121	264	372	231	519	272	790	2448
6384	743	94	85	446	399	671	2438
5701	368	309	514	359	584	271	2405
13221	221	460	387	152	765	350	2335
5832	327	183	139	829	484	371	2333
9251	640	275	325	284	509	284	2317
2700-3299							
Sum of # Pages							

*The Introduction of the CCP and Paper Reduction Campaign*

Printed							
	Jan	Feb	Mar	Apr	May	Jun	Grand Total
Account ID							
19503				169	1208	1914	3291
5842	559	657	362	446	569	687	3280
5216	450	261	242	2011	197	68	3229
5955	495	361	194	221	1529	426	3226
15475	1217	466	265	290	373	607	3218
7052	436	115	356	542	534	1224	3207
13683	573	651	390	754	421	394	3183
6980	513	396	472	551	397	839	3168
5659	385	714	709	300	797	251	3156
15146	488	202	437	279	343	1388	3137
5760	526	321	570	460	594	661	3132
6549	418	486	341	806	840	241	3132
5296	207	792	773	615	485	239	3111
13771	252	286	810	688	456	572	3064
18273	431	579	690	238	633	482	3053
5871	243	1462	180	393	95	680	3053
3640	335	573	477	670	637	360	3052
5593	282	184	1372	457	357	288	2940
7580	227	169	414	1157	704	255	2926
18271	637	310	590	457	474	404	2872
5517	467	450	568	228	631	479	2823
5764	376	755	482	436	453	318	2820
5299	135	215	527	391	1205	325	2798
15397	1572	261	130	122	527	185	2797
18098	490	429	477	207	730	446	2779
5663	547	347	440	460	466	502	2762
7376	596	342	346	510	474	461	2729
14218	318	432	354	436	442	737	2719
10169	311	606	412	417	523	437	2706
16498	599	410	112	764	262	555	2702

*The Introduction of the CCP and Paper Reduction Campaign*

3300-4199

Sum of # Pages Printed							
Account ID	Jan	Feb	Mar	Apr	May	Jun	Grand Total
5693	1622	379	381	239	241	1334	4196
5708	979	390	698	974	801	326	4168
11495	1339	451	383	507	694	773	4147
16090	1060	76	983	1097	834	90	4140
6142	784	920	782	594	630	421	4131
14260	558	991	804	649	649	438	4089
16085	733	1041	422	687	658	491	4032
5438	801	52	1006	376	724	1008	3967
13238	1472	623	559	883	82	342	3961
5206	689	655	778	427	678	674	3901
5516	685	245	204	1049	1321	376	3880
15976	784	1367	1057	671			3879
6670	232	942	77	1322	810	468	3851
5606	85	791	950	777	550	630	3783
13216	167	477	1233	338	568	992	3775
5816	374	311	376	2200	323	172	3756
18238	763	572	445	571	908	492	3751
5565	1430	630	637	252	407	294	3650
18715	2739	836	72				3647
14105	341	251	397	290	2179	186	3644
16675	987	744	962	612	318		3623
15547	463	132	283	1626	483	595	3582
7582	540	608	364	1004	414	562	3492
5563	745	102	498	1284	487	340	3456
5543	678	504	468	1044	345	328	3367
15074	361	558	597	492	709	644	3361
5725	975	478	454	467	417	541	3332

4200-5499

Sum of # Pages Printed							
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*The Introduction of the CCP and Paper Reduction Campaign*

	Jan	Feb	Mar	Apr	May	Jun	Grand Total
Account ID							
16160	127	258	287	4305	202	140	5319
7248	968	1112	601	1483	548	602	5314
11379	2030	586	388	1092	356	850	5302
8173	59	23	53	3949	202	970	5256
5591	636	384	959	1152	1066	1006	5203
7321	152	139	148	69	4342	283	5133
5454	707	923	788	802	973	921	5114
5207	473	806	453	969	1356	1005	5062
5477	14	198	111	1559	2950	160	4992
6628	1036	913	779	672	959	628	4987
7599	2075	256	644	1273	369	365	4982
3658	708	787	843	713	1006	887	4944
5560	1355	1124	279	326	495	1282	4861
18110	940	783	642	722	1056	683	4826
14808	808	598	998	746	846	712	4708
3470	114	26	39	106	4220	83	4588
7465	1127	555	1191	179	839	672	4563
9763	745	119	798	645	1070	1148	4525
5215	1817	802	322	404	771	408	4524
3653	1106	1201	382	630	1065	98	4482
9154	603	367	1480	493	565	945	4453
5647	797	239	219	2657	296	198	4406
8918	325	1273	1245	379	714	469	4405
10008	332	354	840	434	2158	238	4356
13975	998	550	1118	818	300	541	4325
11009	199	93	254	3108	191	473	4318
13186	697	693	622	489	845	939	4285
17830	681	218	588	745	993	1029	4254
5710	450	595	651	476	783	1246	4201

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5500-9999

Sum of # Pages Printed	Jan	Feb	Mar	Apr	May	Jun	Grand Total
Account ID							
5789	73	401	105	8633	322	382	9916
5213	1873	1403	1758	1156	1560	1670	9420
5478	2563	1605	617	1259	1223	1301	8568
5588	1383	1143	1313	1386	1802	1318	8345
5773	359	2205	425	4770	262	183	8204
16535	1270	842	1611	768	1659	2008	8158
14134	683	2668	1018	1147	1431	1156	8103
5575	1014	827	889	1207	957	3189	8083
5768	1076	1156	1135	1563	2248	861	8039
5545	1808	239	2132	866	1591	1070	7706
18272	885	885	1096	1569	1939	1057	7431
12681	822	743	726	2529	1309	1086	7215
5510	1165	1210	934	1221	1379	1178	7087
8914	847	1695	1412	362	1059	1440	6815
13366	509	723	1384	2199	826	1115	6756
10521	3711	35	549	1611	711	130	6747
7040	1067	893	1260	1199	1307	1000	6726
5524	933	1403	1326	675	1557	744	6638
15024	1139	932	1266	3068	156	10	6571
5549	3139	1813	344	476	661	12	6445
5788	791	736	1397	1329	899	1183	6335
10860	2454	2162	165	655	372	475	6283
14687	997	1067	1441	931	990	857	6283
18846	669	558	1119	1235	2050	598	6229
18425	943	1087	1163	1033	1234	736	6196
13927	1325	3040	1826				6191
13880	442	28	74	3255	1752	621	6172
15059	114		863	1370	2807	822	5976
7258	852	1117	1676	194	1977	18	5834
7992	1788	735	1230	270	1169	422	5614



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5391	1158	957	997	1104	470	893	5579
5657	921	436	838	1093	1171	1094	5553
9779	774	1099	457	1333	710	1137	5510

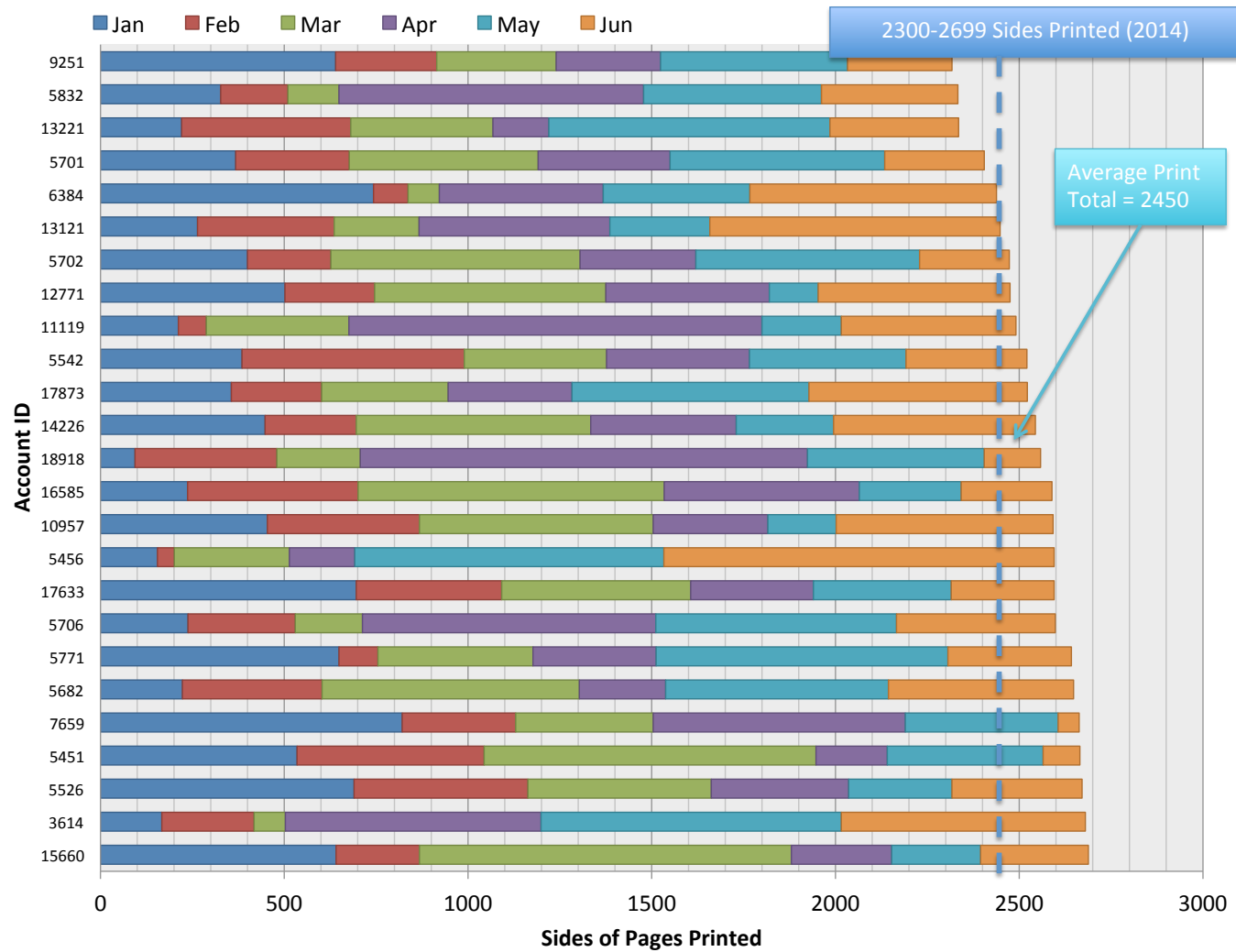
*The Introduction of the CCP and Paper Reduction Campaign*

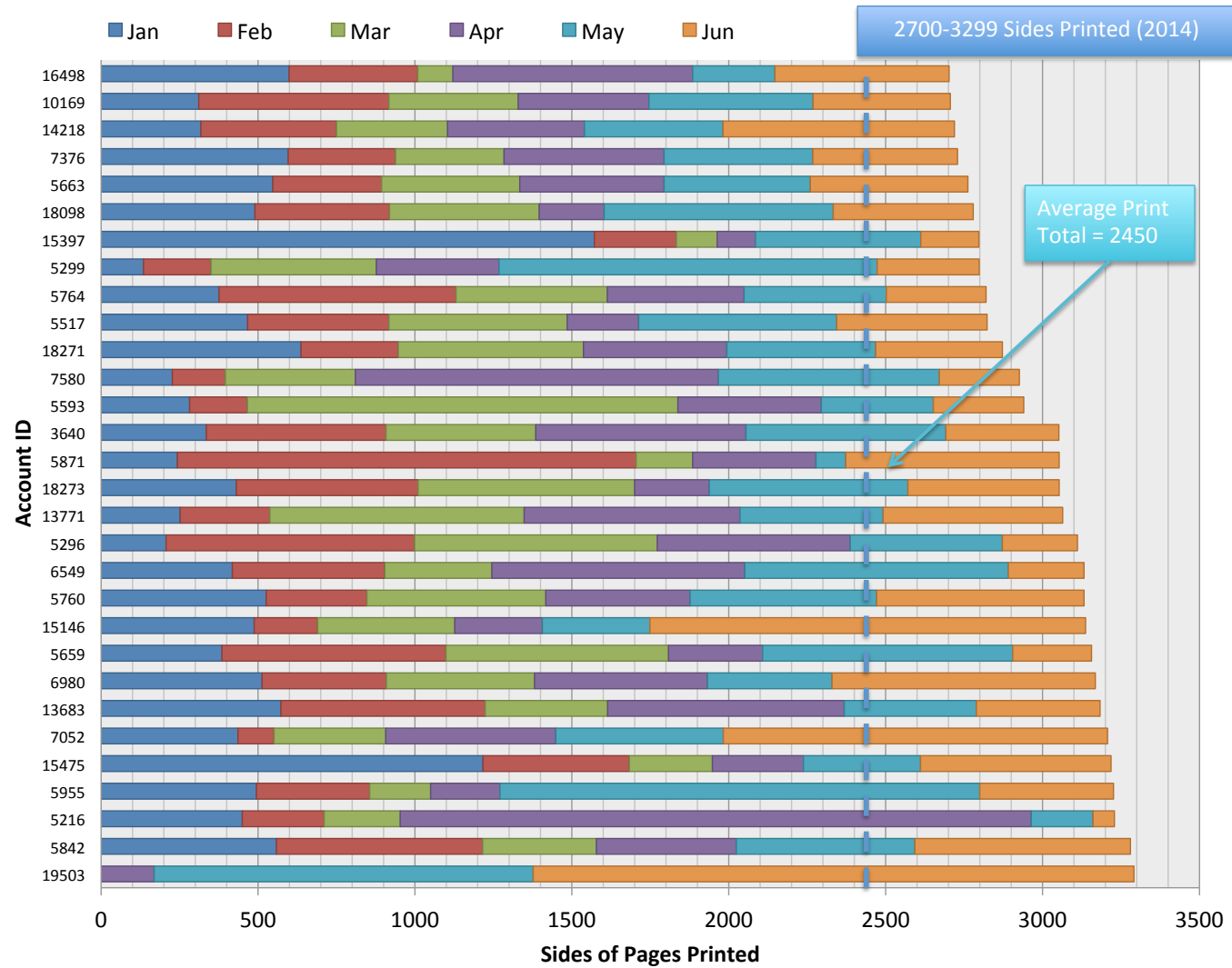
>10000

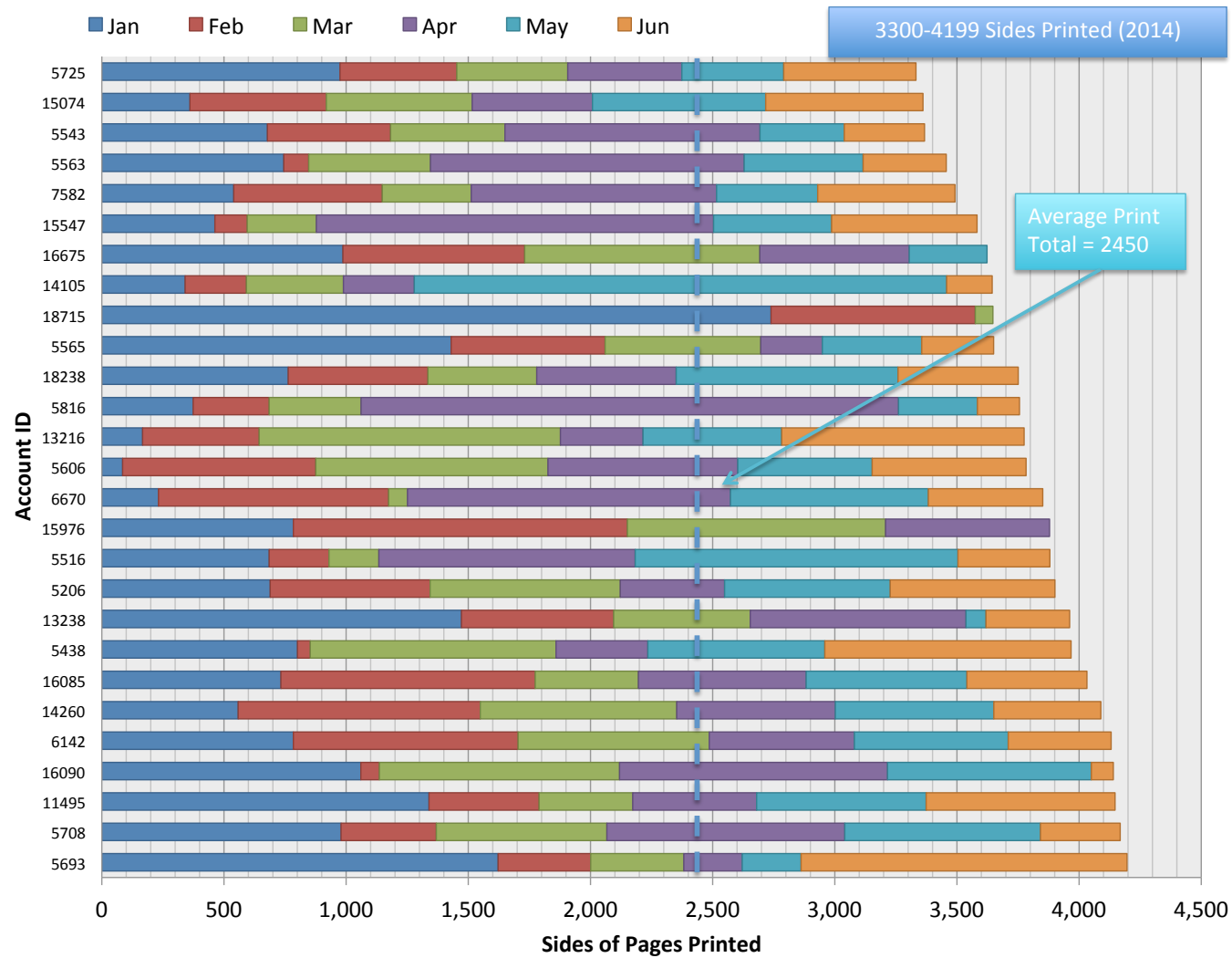
Sum of # Pages Printed	Jan	Feb	Mar	Apr	May	Jun	Grand Total
Account ID							
5551	3493	3321	6502	2515	43642	2562	62035
5452	70	25	135	79	24714	1223	26246
7531	438	286	277	24198	249	238	25686
5883	163	135	125	20396	299	74	21192
15616	3976	3807	2986	2946	3182	3049	19946
19645					12700	6082	18782
5664	612	5264	4149	5610	1408	1545	18588
5582	2913	6538	1208	2686	1769	272	15386
18426	2420	3304	2932	2320	1032	2124	14132
14769			2468	2264	166	8961	13859
7641	2126	1787	3381	3932	2080	368	13674
19231			4490	1574	1326	4519	11909
12822	1498	1326	1422	2120	2318	2392	11076
5531	625	3642	336	530	5439	420	10992
16273	421	293	2092	2865	2602	2206	10479
14756	193	137	256	135	9621	114	10456
7406	2758	3	4	6360	297	985	10407
5290	1692	2434	1692	1256	1529	1648	10251
14927	3047	507	557	1429	4049	492	10081

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Printer ID	Jan	Feb	Mar	Apr	May	Jun	Grand Total
5167	302	360	469	342	29016	1493	31982
5170	7970	10058	5185	6168	5687	4497	39565
5183	4760	5174	4864	5014	6606	4163	30581
5270	3014	2386	2549	2237	12380	2362	24928
5272	5134	5529	5646	3605	4608	5042	29564
5278	14398	14062	11381	10320	18251	9413	77825
5280	3733	5514	4211	5038	6765	4649	29910
5288	2904	3117	3605	6467	6248	4319	26660
5291	4819	1748	3118	9457	1956	2039	23137
5306	3734	2965	2684	4074	3457	3209	20123
5320	2779	2509	3069	13645	2942	2341	27285
5328	1948	1165	1798	22117	1782	2164	30974
5340	3578	2861	3727	4432	5880	7419	27897
5350	8452	7934	8362	9836	12208	10839	57631
5364	7756	5595	5618	8869	5544	5688	39070
5368	2030	2559	5970	5609	3231	3779	23178
5370	4177	4749	5080	3275	43799	2865	63945
5372	3640	3282	3173	2895	3636	3644	20270
5505	4743	4728	4567	6421	5051	4612	30122
5521	3124	1964	4693	5263	3758	2701	21503
7967	5417	4418	6052	6719	8388	6232	37226
11254	4925	3105	3415	4142	4037	5033	24657
12028	1874	4003	3327	11059	3292	9812	33367







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