Our mission is to reduce waste today through innovative resource management and to reach a waste-free tomorrow by demonstrating that waste is preventable, not inevitable.

Macalester College Baseline Study and Zero Waste Recommendations

In 2006 Macalester entered into a resource management contract with Eureka Recycling, a local nonprofit with a mission to demonstrate that waste is preventable not inevitable. Eureka Recycling and Macalester identified the need to establish a baseline of Macalester College's waste stream in order to identify waste reduction recommendations and later judge the efficacy of efforts to reduce waste.

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Baseline Data

To establish this baseline and identify zero waste recommendations, Eureka Recycling used four methodologies:

- Evaluate recycling communication systems for consistency, thoroughness, and sustainability
- Analyze the basic recycling and garbage infrastructure for consistency and clarity
- Conduct waste audits to determine exact contents of the garbage
- Monitor current waste resources for quantity and variability

Systems for Recycling Communication

Communication is an absolute necessity for a successful recycling program. On a campus with a community that changes constantly, having systems to ensure recycling communication is critical. Working systems ensure consistency, thoroughness, and sustainability of both the recycling infrastructure and information surrounding the infrastructure. Additionally, in order for Macalester to be innovative in achieving its zero-waste goals, it also needs a system to research, evaluate, implement, and enforce further waste reduction measures. Ideally all of these systems would be monitored by a Zero Waste Committee or similar campus-wide organization to ensure all departments and aspects of the Macalester community are represented.

Current Systems

Infrastructure Communication: A thorough infrastructure communication system ensures that recycling and trash cans are optimally placed to increase recycling and decrease cross contamination. A good system takes advantage of various departments' knowledge and expertise in order to be sustainable and consistent. Currently, Facilities Management is responsible for placing all recycling and trash containers. While this is consistent, it lacks sustainability and thoroughness because Facilities Management staff is limited in their ability to enforce recycling compliance and understand individual office recycling needs. An ideal system would incorporate knowledge from people who use the recycling and garbage cans as well as the people who service them.

Information Communication: Inquiry into a campus-wide system for communicating recycling information revealed none. A website was mentioned, but could not be located. There seems to be no body responsible for ensuring consistent outreach and education regarding recycling information at Macalester. During the baseline study, we asked faculty, staff, and students ranging from freshmen to seniors the following questions:

- Did you receive any materials or instructions about recycling during your orientation period?
- Have you received any recycling information, instructions, or updates since you first started working or studying at Macalester?

The answer for all groups was a consistent "no." Some staff said they figured out what to recycle by looking at the containers.

Waste Reduction Communication: Investigation into Macalester's recycling and waste reduction efforts towards zero waste showed a lot of individual endeavors but also many gaps in communication. A Waste Reduction Communication System would close the gaps and ensure current steps towards zero waste constantly build on each other, regardless of community turnover.

Basic Recycling and Garbage Infrastructure

The basic recycling and garbage infrastructure includes all containers and systems used to collect and transport waste from the campus. Ideally a campus Zero Waste Committee would regularly evaluate the basic recycling infrastructure and adjust the systems for communication if they weren't keeping up with campus needs. However, since no such committee or system is currently in place, Eureka Recycling analyzed the basic recycling and garbage infrastructure for the baseline. Public and private recycling stations were looked at, as well as special waste generators, such as Café Mac and campus events. When analyzing the basic recycling structure for consistency and clarity, Eureka Recycling identified room for improvement. Although servicing of materials was sufficient and the container types tended to be consistent, the quantity of stations and labels tended to vary, and the labels also lacked clarity.

Collection Systems

Garbage and recycling are each handled differently on campus; however, both are serviced consistently.

Garbage is collected by janitorial staff and brought to eleven dumpsters located throughout the campus. The dumpsters range in size from 2 to 30 cubic yards. During the summer months the dumpsters are emptied one to three times a week, and during the school year most are emptied daily or a few times a week. Two dumpsters, a 30-yard, and a 2-yard, are emptied on an on-call basis (typically less than once a week).

Materials recycled at Macalester include mixed office paper, cardboard, bottles, and cans. Bottles and cans are commingled, while cardboard and office papers are each collected separately. Recycling is collected by up to 25 designated work-study students who transport bottles, cans, and paper from each building to two central locations where the materials are emptied into 90-gallon carts. Additionally, there are two cardboard compactors on campus. Work-study students pick up all cardboard from recycling stations around campus and bring it to the closest compactor, either at Campus Center (which is also used by the cafeteria) or Olin-Rice. Eureka Recycling collects all of the recycling once a week throughout the year.

Recycling and Garbage Stations

There are several collection points for both garbage and recycling throughout the campus that students, faculty, staff, and visitors use daily. Currently, garbage cans and bins are prevalent indoors and outdoors, and recycling collection stations can be found indoors only. Whether accessible to the public or kept privately under a person's desk or in an office, Macalester's recycling and garbage stations were consistent in container type but inconsistent in quantity. Signage, when existing, lacked clarity.

Container Types: Recycling and trash containers look identical. Desk containers include two small bins, one significantly smaller and hanging onto the other (see Figure 1). The majority of containers in public locations are gray "Slim Jim" Rubbermaid containers with swing lids. However, buildings such as the Campus Center, Olin-Rice, and Weyerhaeuser have a variety of different models. Many of these containers have been purchased with campus design in mind. In the Campus Center they are built in to the wall (see Figure 2) while in Humanities, they are located within a space in the wall (see Figure 3). The Olin-Rice containers are large and uniform (see Figure 4).

Figure 1

Figure 2

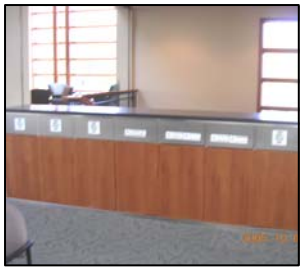


Figure 3

Figure 4

Container Quantity and Labels: A review of public stations revealed that garbage cans tended to outnumber recycling containers sometimes by as much as 5 to 1(see chart below).

Garbage Bin to Recycling Bin Ratio		
BUILDING	**Stations with both recycling and garbage**	**Additional stations with garbage cans only**
Wallace	5	4
Dupre	5	20
Olin-Rice	3	6
Campus Center	4	10
77 Mac	4	0

Labels for public space recycling and garbage, although consistent in appearance, are often confusing. Further inquiry showed that the confusion results partially from changes to Macalester's recycling collection system since the labels were initially designed. As seen in the photographs below, recycling and trash signs are very similar in appearance.

An audit of all signs at public and private locations brought forth the following issues:

- Some trash bins say "We Recycle Trash" next to a recycling symbol
- Paper recycling sign says "Paper" with no description of what recyclable paper includes (office paper, cardboard, boxboard, envelopes with windows, and magazines)
- Recycling stations often have two separate containers for collecting "Cans" and "Glass and Plastic;" however, one bin will only be labeled "Cans" while the other bin will have both "Cans" and "Glass and Plastic" labels
- Signs have no illustrations or sample pictures of cans and bottles
- Recycling and trash signs are sometimes absent from bins or obscured by trash bags
- Most desks had containers but no signs to indicate whether they were to be used for garbage or recycling

Shared office spaces were the most inconsistent, at times lacking containers, and at other times lacking signage. For instance, the computer labs in Olin Rice all have trash bins and paper recycling containers, while in Dupre, the labs have trash cans but no formal paper recycling containers (though in at least one lab, students have been putting paper in an unmarked cardboard box).

Café Mac Recycling

Café Mac recycles cardboard consistently but there is no infrastructure for recycling bottles and cans from the cafeteria. Lori Hartzell, Café Mac manager, says they generate around 300 large bottles and cans a week and that space constraints and health codes have previously prevented them from creating a recycling infrastructure to recover this material. The 10–15 bottles and cans collected per meal would need to be emptied after each meal to meet health code regulations.

Event Recycling

Currently there is no formal event recycling structure. According to Jim Davidson, 2nd Shift Custodial Supervisor, custodians put out extra garbage and recycling containers when requested or if they are aware there will be a large amount of recyclables. However, garbage cans are more frequently added than recycling containers. The latter also tend to get contaminated heavily during events. Catered events also lack consistent recycling infrastructure because Bon Appetit's catering crew only has rolling garbage cans, so all waste, recyclable or not, ends up in the garbage.

During the baseline study the Alumni Office rented event recycling and composting containers for an LGBT reunion of 120 people. Over 100 pounds of material was recycled.

Inside the Dumpster: Waste Audits

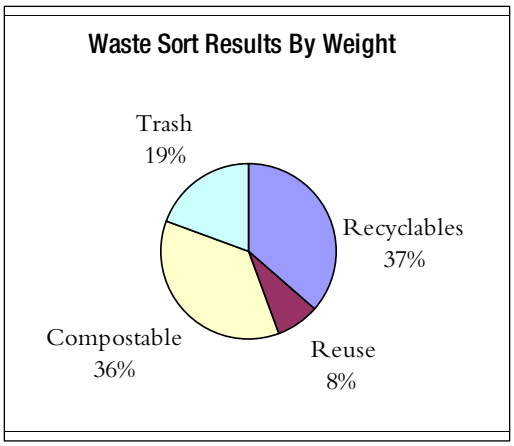
An estimated 75 tons of recyclables were thrown into the garbage at Macalester during the six-month baseline study (May – October 2006). Eureka Recycling arrived at this estimation by conducting a total of twelve waste sorts at four different waste collection sites. These sites—three 6-yard dumpsters and several 90-gallon carts from the Wallace dorm—were chosen because they represent all aspects of Macalester life. The sorts were performed in July, September, and October to catch waste generated both during the school year and over summer break.

During the waste sorts items that were compostable or recyclable were not put back in the garbage; instead, they were diverted to their proper destinations. Eureka Recycling pulled over 1,300 pounds of recyclable, compostable, and reusable materials from the garbage.

Additionally, Eureka Recycling did two visual audits of waste produced at Café Mac and the 30-yard dumpster at Olin-Rice.

Waste Sorts

Materials found in Macalester's garbage dumpsters and carts include paper, cardboard, food waste, food packaging, bottles and cans, plastic, paper-based and Styrofoam containers, electronics, and personal care product waste (primarily coming from the dorms but also from other bathrooms). Seasonal changes and campus renovation projects resulted in additional waste, including construction and demolition debris, furniture, and yard waste.



Recyclables made up an average 37% percent of the materials by weight found in the garbage dumpsters. The most prevalent recyclable item found in the garbage was paper followed by bottles and cans. A minimal amount of scrap metal was also found. The percentage of recyclables in garbage varied at each waste sort site, but the average remained consistent through the seasons with only five percentage points of variation.

Compostables comprised 36% of the material being thrown into dumpsters and like recyclables, showed more variation between sites than between seasons. This category included some food, but primarily consisted of paper towels and paper-based food packaging (for example paper cups, take-out sandwich wrappers, and milk cartons).

Trash, defined as items that are not compostable, recyclable, or reusable, comprised 19% of the dumpster contents. This percentage remained even more consistent than all the other categories with only three percentage points of variation. By separating trash into several categories, other waste reduction options besides recycling, composting, and reusing were identified.

Surprisingly (considering how light they are), plastic bags were the most prevalent non-recyclable or compostable item by weight found in the waste stream. They made up 40% of the trash (8% of the entire garbage stream) by weight. Three-fifths of these were garbage bags that were emptied as we consolidated garbage and diverted recycling and compostables. The majority of garbage bags pulled from the dumpster had very little trash in them. Further investigation revealed that Macalester has a "clean sweep" policy, which requires that all waste containers be emptied daily, regardless of the fullness of the bag. All of the other plastic bags, which consisted mostly of grocery sacks and sandwich/lunch bags, might have been reusable or recyclable before contamination by food waste.

The other 60% of the trash (11% of the total garbage stream) consisted primarily of plastic and Styrofoam food and beverage containers, wrappers, and a few seasonal items like painting supplies and landscaping paper.

Potentially **reusable items** made up 8% of Macalester's waste stream. Reusable items varied greatly, and included pens, clothes, electronics (including one laptop), and dishes.

Visual Audits

Eureka Recycling toured the kitchen at Café Mac, Macalester's campus cafeteria, and did a visual audit of their waste stream, which is primarily food. This food waste is all pureed in a garbage disposal unit. According to Lori Hartzell, manager of Café Mac, the kitchen produces about 100–150 gallons of pureed food waste per day. Other items found in their waste are typical of the rest of campus.

Six times throughout the semester Eureka Recycling looked into the largest dumpster on campus near the Olin-Rice building to assess what, aside from ordinary bagged garbage, was collected there. This 30-yard dumpster is five times the size of the average campus dumpster, and Macalester uses it to dispose of their bulkier items as well as all other garbage from the Olin-Rice building. During our visual audits, Eureka Recycling observed that a monitor, computer parts, furniture, cardboard, Styrofoam, and other packing supplies were thrown away in this dumpster.

Macalester's Current Waste Resources

Using Macalester's current waste and recycling systems, 83% of the waste stream ends up in the garbage and only 17% is diverted to recycling. These percentages have been determined using tonnage reports from Macalester's garbage hauler (Veolia Environmental Services) and their recycler (Eureka Recycling). Ideally a Zero Waste Committee would monitor these totals in order to judge the efficacy of their current recycling systems.

Trash Overview

The amount of trash generated on campus varies drastically throughout the year depending on the season. Waste production can dip down to 20 tons per month in the summer, but during the school year it more than doubles to over 47 tons per month.

Month	May	June	July	August	September	October
Garbage (tons)	31.51	20.19	23.29	30.89	47.46	46.93

During the summer, garbage service costs an average of $4,861 per month. During the school year, average monthly costs rose to $6,333.

Recycling Overview
The amount of recyclable materials collected (recycling tonnage) varies as much as the amount of trash collected throughout the year. During the summer months recycling collection dipped to less than 4 tons of recyclables per month. During the school year this quantity escalated to nearly 9.5 tons per month.

Month	May	June	July	August	September	October
Total Recycling (tons)	7.58	4.61	3.67	6.01	7.27	9.42

During the Baseline study the amount of recyclable materials collected was too low to generate revenue above the cost of hauling and processing.

Yard Waste
Macalester has a 30-yard dumpster for collecting grass, leaves, and branches that is brought to a composting facility. This dumpster filled up about every other month during the baseline study. Its weight is unknown and not included in the baseline weights above.

Electronics Recycling
Eureka Recycling investigated how Macalester handles electronics recycling due to the hazardous components found in electronic waste and the recent Minnesota legislative ban on residential CRTs (from monitors and television screens). In addition, the public has shown concern about how materials are handled when they are shipped overseas to countries that do not have the same regulations as the U.S.

Information Technology Services (ITS) is currently in charge of ordering and disposing of all computers at Macalester. The 4 – 8 pallets of computers ITS orders each year generate very little packaging waste – they arrive shrink wrapped on a pallet. When a working computer reaches the end of its life at Macalester, it is donated to a nonprofit or charity organization. Non-working electronics had previously been picked up by Que Computers, who sort and sell the working parts, and break down non-working parts to sell for scrap. Near the end of the baseline study Macalester started using Integrated Recycling Technologies (IRT) instead, a company that only accepts computer-related electronics. IRT will not release information about where they send their materials to be recycled. The amount of electronics ITS recycles was not quantified during the baseline study.

Christian Nelson, who works in ITS, states that he tries to recover monitors if he sees them abandoned in campus dumpsters, but there is no formal system for collecting electronic waste generated outside of ITS.

Summary
There is immense opportunity to reduce waste and increase recycling at Macalester. The baseline study revealed a variety of available options and people interested in setting the college on the path towards zero waste. Clearly, the next step on the road to becoming a leading zero-waste campus is to establish a Zero Waste Committee to create systems to ensure a consistent basic recycling infrastructure and craft cohesive communication systems.

Recommendations

By implementing a contract that supports and encourages increased recycling and waste reduction on campus, Macalester College has already started on the road towards becoming a waste-free institution.

In order to continue on this path Macalester now needs work in two areas that are related and should be improved together. First Macalester needs to create a system for recycling communication so that all attempts at increasing recycling and reducing waste are communicated campus-wide, monitored, evaluated, and adjusted as necessary.
Second, in conjunction with the first, the college needs to solidify its basic recycling infrastructure so that it is able to recover all potential recyclables.

Systems for Recycling Communication

There are many enthusiastic and devoted people currently working on waste reduction and recycling measures at Macalester. What is lacking is an organized system that creates a bridge of communication for these people, monitors current waste resources, and identifies any current gaps in communication on the road towards zero waste. We recommend organizing a Zero Waste Committee to fulfill this need. Once the committee is formed, it needs to be publicized and integrated into campus life so that it will sustain itself regardless of community turnover. In order to ensure sustainable, thorough, and efficient systems for communication, Eureka Recycling recommends the following:

Step One: Organize Zero Waste Committee (ZWC)

- Formalize the roles and responsibilities of the members of the ZWC
- Clarify long-term (zero-waste campus) and short-term (improve basic recycling structure) goals of the ZWC
- Remedy gaps in systems for recycling communication
- Create a plan to achieve and monitor success of long-term and short-term goals
- Set a regular meeting schedule

Step Two: Launch Campaign to Increase Internal Awareness

- Publicize the formation of the ZWC
- Develop key messages about the resource management contract and tie them into the college's core principals
- Meet with selected department heads and administrative offices to communicate contract goals
- Launch campus outreach to ensure students, faculty, and staff are familiar with the contract goals and know who their representative is on the ZWC

Basic Recycling Infrastructure

With 37% percent of the garbage generated on campus being recyclable, Macalester needs to set up recycling infrastructure that is able to capture those resources. With a Zero Waste Committee monitoring waste resources, Macalester can start taking steps to capture this lost material. By recovering this material, not only would garbage be reduced, but recycling would more than double.

Month	May	June	July	Aug	Sept	Oct
Current Garbage (tons)	31.51	20.19	23.29	30.89	47.46	46.93
Recyclables thrown away (est. tons)	11.66	7.47	8.61	11.42	17.73	17.36
Current Recycling (tons)	7.58	4.61	3.67	6.01	7.27	9.42

Step One: Containers

The baseline study consistently showed that although nearly half of Macalester's total waste stream is recyclable, it is twice as easy to find a garbage can as it is to find a recycling station on campus. Macalester needs to create equal opportunities for recycling. This can be accomplished in one of two ways—either by increasing recycling stations or by decreasing garbage cans. Based on the amount of empty or nearly empty garbage bags found in Macalester's waste stream, we recommend the Zero Waste Committee create a plan to enact the following steps on an established timeline while monitoring the waste resources for results:

- Remove the least-used garbage cans
- Place both paper and bottle and can recycling containers by all remaining garbage cans (both public and shared office locations)
- Establish consistent cardboard recycling in every building
- Purchase event recycling containers and set up a system for using them (through Facilities Management and the event programming department)
- Consider changing to recycling containers that are easily differentiable from garbage containers

Step Two: Labels and Signs

Recycling outreach and education can take many forms, the most basic of which is labels and signage to instruct people how to recycle. The baseline study showed that signs have not been updated since Macalester's recycling collections system has changed. Studies show that successful recycling stations must be clearly labeled. This means signs must have simple, easy-to-read language, pictures or illustrations, and recycling and trash labels must have a dramatically different look. To improve outreach and education we recommend the Zero Waste Committee create a plan to enact the following steps on an established timeline while monitoring the waste resources for results:

- Redesign all signs and labels
- Make recycling and garbage labels look very different from each other and easily recognizable
- Create labels and signs to instruct people where cardboard goes
- Create consistent labels for private (office) recycling stations (no more using your recycle bin as a garbage bin!)
- Create posters that educate the Macalester community about recycling

Conclusion

The baseline study showed that there are numerous ways to reduce waste on campus. In order to become a leader in creating a waste-free college, Macalester needs a firm zero-waste foundation in the form of thorough systems for recycling communication and a solid basic recycling infrastructure. Once these systems and infrastructure are in place, Macalester will have the tools it needs to continually work towards a waste free tomorrow.