

# 25 by 25

**An Action Plan for Achieving 25%  
Sustainable Food Procurement by  
2025 at Skidmore College**

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MAY 2019

SKIDMORE COLLEGE

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**A Capstone Research Project  
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## **Abstract**

Reflecting the college's values, Skidmore College has committed to 25% sustainable food procurement by 2025. Positive efforts have been more toward this goal, but progress has stagnated and significant work remains in order to reach the goal within the next six years.

We assembled a portfolio of projects that address this goal and assessed their feasibility, analyzing both their financial and intangible impacts. Similarly, we assessed their perceived support by relevant stakeholders. Our projects included a targeted purchasing analysis, a plant-biased buffet, a food waste management system, intensive on-campus production, and a Saratoga area sustainable food purchasing network.

While some aspects of these projects will require significant investment and may not see return for several years, together we found that these projects could account for the increased expenditure necessary to reach the college's sustainable food goal. Moreover, these projects support sustainable local food, increase educational opportunities on campus, reduce environmental impact, and solidify institutional purchasing commitments.

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## Executive Summary

- Progress on sustainable food procurement at Skidmore is calculated from food expenditure. Since 2015 (when we began tracking), our sustainable food percentage has hovered around 10% -- most recently at 11.27%. We will need an additional **13.72% in the next six years** to achieve our sustainable food goal.
- From 2016-2018, Skidmore College Dining Services had an average annual food spend of \$3,232,719 and spent \$316,981 on average on sustainable foods. In order to reach 25%, we will need to increase annual expenditure on sustainable foods by roughly **\$491,198** within the next six years.
- This increase in **expenditure can be neutralized** by the reduction in costs and/or revenue generated by the portfolio of projects presented in this report.
- Apart from their financial impacts, these projects have **intangible impacts** that benefit the campus community and the planet.
- Projects investigated in this report were identified through archival analysis of relevant research (both peer-reviewed and from Skidmore students), and from conversations with representatives from peer and aspirant institutions as well as stakeholders at Skidmore College.
- We identified 20+ products that are ideal candidates for **complete purchasing shifts**. Committing to any combination of these sustainable alternatives will be a relatively easy, enduring and impactful change.
- **Reducing meat consumption** in the Dining Hall could be a lucrative solution. However, efforts to do so should be focused on menu change, and not leveraging the convenience of diners.
- **Reducing food waste** through a food waste management system for post-consumer waste contracted from LeanPath could provide Dining Services over \$300,000 in savings annually.
- **Intensive-on campus production** in a hydroponic shipping container from Freight Farms could provide Dining Services fresh and sustainable leafy greens throughout the year and begin to generate profits between 3 and 10 years (depending on labor).
- Collaboration with local institutions is important for building a **reliable and competitive market for sustainable food** in and around Saratoga Springs. However, coordination of purchasing may be best done by distributors.
- The projects presented in this report work together-- pursuing them independently cannot ensure success towards the goal.
- Progress toward our sustainable food goal will not be made unless there is **sustained and informed effort** by both students, faculty, and staff. Follow up should be done to ensure these projects are implemented intentionally, along with others yet unidentified.

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## Introduction

At Skidmore College, it is often said that 'creative thought matters'. More than simply a slogan, the phrase epitomizes an educational philosophy embodied by the institution:

*Genuine creativity requires rigor of thought and practice that connects knowledge and imagination with discipline. The more we develop our students' capacity to make that connection, the more they will be able to respond to the world in ways that truly matter.*

-Phillip Glotzbach

At a time when the tide of issues facing the planet and its people feels almost insurmountable, the need could not be greater for a new generation of leaders with the ability to address wicked problems with originality and ingenuity. Accordingly, Skidmore's campus itself acts as a sort of test site, where students can realize their ideas, putting solutions into action with the potential for impacts far beyond its grounds. In this way, the learning that occurs in the classroom is reflected by the infrastructure and resources that support it. Nowhere is this holistic model better exemplified than in sustainability initiatives at Skidmore College. Often spearheaded by students, projects such as the 2.1 MW solar array, campus bike-share program, and composting system acknowledge the impacts of energy use, greenhouse gas emissions, and solid waste that the campus community has, and help put into practice those theories and principles upon which a more sustainable future rests (Skidmore College, 2018).

Skidmore's campus, however, does not exist in isolation. Located in Saratoga Springs, New York, it is situated where the foothills of the Adirondack Mountains meet the Hudson Valley-- one of the state's most productive agricultural regions. As a prominent institution in the Saratoga Springs community, Skidmore College is an integral part of the culture and economy of the flourishing city, as well as the rural areas which surround it. Since its founding in 1921, the College has witnessed many changes in the area which echo the turbulence of a changing world. Saratoga Springs has been transformed from primarily a summer recreation destination, to being a

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commuter suburb of Albany. Similarly, the plentiful small farms of the area gave way to larger commercial operations. Though the Upstate New York region is still one of the foremost producers of dairy and apples in the country, the number of farms from 1910 to 1982 decreased from over 200,000 to less than 50,000 while the average farm acreage more than doubled. That number has reduced to just 36,000 today (FINYS, 2018). Across New York State as a whole, over 13 million acres of farmland have been taken out of productive agriculture since 1900 (New York Farm Bureau 1988). Not only did these changes have an impact on the economic backbone of the region, the practices of industrial agriculture have had serious implications for the environment. In New York and around the world, industrial agriculture is polluting waterways, creating dead zones in the oceans, destroying biodiverse habitats, releasing toxins into food chains, endangering public health via disease outbreaks and pesticide exposures, and contributing to climate change (Kremen et al., 2012). Half of the topsoil on the planet has been lost in the last 150 years. In America alone, we lose 1.7 billion tons of topsoil every year (American Farmland Trust, 2018). In the last 50 years, global nitrogen use has increased eightfold, phosphorus use tri-fold, and global pesticide production eleven-fold (Tilman et al., 2001). Food travels thousands of miles before it is put on display at the supermarket or in a restaurant, further contributing to increased amounts of carbon dioxide emissions in the atmosphere.

Institutions of higher education around the country have been realizing the important role they play in the food system. Accordingly, Skidmore College is one of many institutions in the Northeastern United States enacting measures to increase the sustainability of its food services. In 2017, Farm to Institution New England (A non-profit organization dedicated to increasing purchases of locally-grown food in schools and institutions in the Northeast) found that over 95% of colleges surveyed in the region proclaimed local food purchases to be a part of their dining services budget. Of these schools, just over one-fifth (21%) of the budget was reserved for regional food, while colleges with self-operated dining services spent an averaging of 27.5% of their food budget on local food procurement (FINE, 2017). Beyond food purchases, many New England colleges and universities are supporting sustainable food production and education via on-campus farms and gardens. 41% of colleges surveyed reported that their campus had an onsite garden or farm, ranging in size from 0.1 to 50 acres. Of



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those colleges that had a garden or farm, 91% of dining services operations utilized at least some amount of produce from the garden or farm (FINE, 2017).

At Skidmore, the fundamental link between college and community, and between principles and practice, is once again realized in the Dining Hall. As the kitchen is to the home, many would say that Skidmore's Murray-Atkins Dining Hall is the heart of campus. There, staff, students, and faculty gather to enjoy the food that ranks in the top fifty of college dining halls within the nation (Skidmore College, 2018). Passionate about encouraging a sustainable food system, students, staff, and faculty in partnership with Dining Services, have made great strides towards that vision by reducing both pre-consumer food waste, purchasing from local farms and distributors to procure local, organic, fair trade, and humane foods, all the while providing healthier options for its clientele. Akin to Northeastern institutions, Skidmore's own student-designed and operated community garden supplies Dining Services with over 1,000 lbs. of fresh produce annually and provides students and staff the opportunity to engage physically with the food system (Skidmore College, 2018). Even those not eating in the Dining Hall, such as students living in on-campus apartments and faculty living in town, can be active participants in the local food system by subscribing to the CSA (community supported agriculture) offered by local organic farm, 9 Miles East. Every Friday in the Atrium of the Dining Hall, students and faculty with farm-shares come to reap the bounty of seasonal produce through this fruitful partnership.

Skidmore's efforts to support sustainable food aren't the result of a fashionable local food trend— they are real commitments. Formalized in 2015, Skidmore College developed its Campus Sustainability Plan, which specifically articulates goals to be met in the areas of energy, food, waste, lands and grounds, and engagement by the year 2025. Recognizing the integral connection between ecosystem and human health, as well as its leverage to influence the food system, the plan aims to have at least 25% of total food purchases meet the institution's Sustainable Food metrics by 2025. These metrics require the food to be local and community-based (within 150 miles of the campus), as well as produced under fair working conditions to people, humane conditions for animals, and with ecologically-sound practices for the planet (Campus Sustainability Subcommittee, 2015).

While Skidmore has made great strides in effort to reach this goal in the last four years, there is still much work to be done. As of 2018, only 11.27% of food purchases

were sustainable, an increase of only of 1.05% from 2015. While these numbers may seem small, with the amount of food being processed and served through Dining Services, a nearly 14% increase in sustainable food procurement in the next six years represents a significant challenge. In an effort to address this gap, this report will examine the potentials for increasing sustainable food procurement at Skidmore College. By building off of work completed by other Skidmore students and examining the initiatives of other peer and aspirant institutions, as well as taking inspiration from the sustainable food movement at large, we present several recommended paths of action for the College to meet its goal.

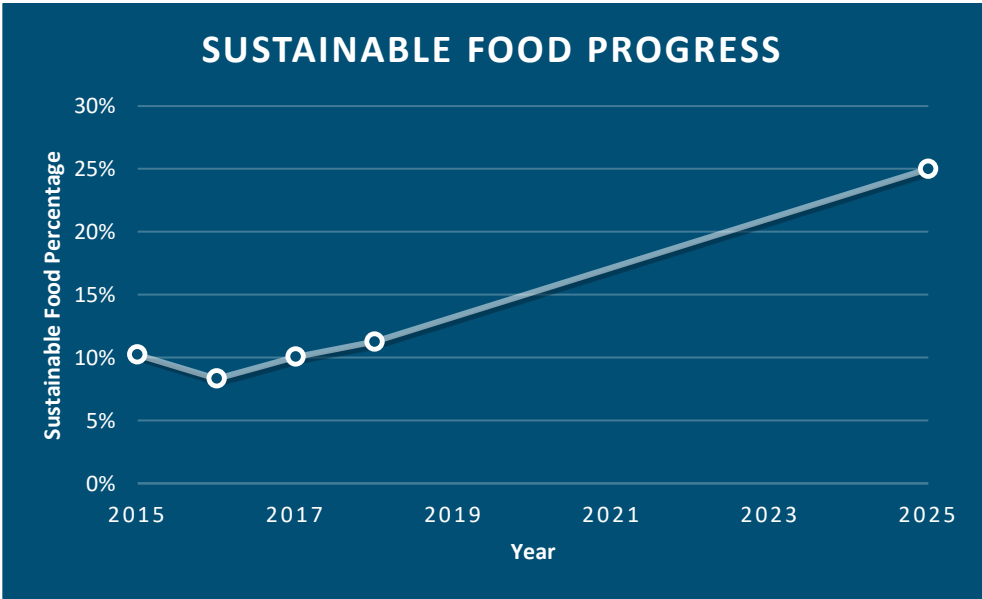


Figure 1: Sustainable food progress past and future

**Methods**

This project takes the form of an action plan: it will serve to guide Skidmore College towards its goal of 25% sustainable food procurement by 2025. As researchers, we assume the role of consultants to compile the most relevant information in order to create the best-informed path towards that goal. Primarily, our efforts will be aimed directly at Skidmore College’s campus, but we will be casting a larger net in our study by examining the progress of campus food sustainability projects in the Northeastern US region for a more comprehensive context.



This mixed-methods study includes both quantitative data on the effectiveness of various Campus Food Sustainability Projects (CFSPs) (in terms of food procurement and investment), and qualitative data on the perceived impacts of CFSPs to campus communities (both benefits and issues). The first phase of our research began with an archival analysis to determine which projects we would pursue for more in-depth investigation. We evaluated the Campus Sustainability Plan and its subsequent annual reports to motivate and provide framework for potential strategies. This archival analysis also encompassed the work of previous Skidmore student research in the form of ESS Capstone research projects and Sustainable Food Intern reports. To further assist in choosing our feasibility studies, we reviewed published literature on campus agriculture projects, sustainable food systems, alternative food production, agriculture education, and sustainability initiatives in institutions of higher education.

Correspondingly, we spoke with key individuals involved with sustainable food initiatives at other colleges and institutions to learn about their successes and challenges. From these conversations we created a long list of potential sustainable food procurement projects that could be implemented here. We then met with individuals critical to food procurement in Skidmore's Dining Services to narrow down our potential projects, and subsequently pursue in-depth feasibility analyses.

With these projects chosen, we moved into the second phase of our research, which involved further relevant archival analysis as well as interviews in person and over the phone to collect more qualitative data. We had a number of target individuals that were vital to our data collection for different purposes. We were interested in hearing from these individuals their opinions on the feasibility of these potential projects based on their respective experiences, and what kinds of broader intangible impacts they might have. Table 1 lists these individuals, their occupations, and the reason we interviewed them.

Table 1: Names, Occupations, and Reasons for Interviewing Individuals

Name	Title	Reason for interview
Mark Miller	Director of Dining Services at Skidmore College	To better understand the difficulties in reaching Skidmore's 25% goal with regard to the budget
(Various)	Sustainable Food Student Interns in Murray-Atkins Dining Hall	To trace sustainable food purchases at Skidmore

Levi Rogers	Director of Sustainability Programs and Assessment at Skidmore College	To gather opinion on sustainable goal efforts at Skidmore
Jim Rose	Executive Chef at Murray-Atkins Dining Hall	To assess Skidmore's menu in the Dining Hall for possible changes that would save money
Patrick Gerard	Business Manager at Murray-Atkins Dining Hall	To discuss the logistics of the dining services budget
(Various)	Relevant individuals at peer and aspirant institutions	To inspire Skidmore to attempt stronger efforts to reach our goal
Carol Kosiba	Assistant Supervisor Purchasing/Receiving in Murray-Atkins Dining Hall	To discuss the specifics of items purchases (from where, how much, why)

In addition to qualitative data gathered from these key individuals, we also gathered quantitative data on the financial aspects of implementing the CFSPs under investigation. This involved estimating the capital investments and ongoing costs for each project, as well as the expected return/savings. This information was compiled to allow us to view these projects not as separate efforts, but as combined tactics which together could have a real impact on the dining services budget, and therefore on sustainable food procurement.

**Project Summaries**

***Targeted Purchasing Analysis***

**Background**

Given that there is a portfolio of projects within this research that reduce costs or generate revenue, there still remains the task of actually buying sustainable food. In an effort to address the fact that buying sustainable foods as 25% of all food purchases is ‘easier said than done,’ it became apparent that this action plan needed recommendations to make that shift in purchasing as easy as possible. Purchasing sustainable foods can involve many uncertainties, such as: knowing if a product counts under certain sustainable food metrics; knowing which sustainable alternatives are “better” from a variety of perspectives; knowing if there is room in the budget for a shift to a sustainable alternative; or knowing how much of an impact that shift may ultimately have. In an effort to reduce these uncertainties, this action plan seeks to

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support informed and impactful purchasing decisions by providing pertinent information based on previous purchasing history and current availability of sustainable food products.

Because we calculate sustainable food procurement at Skidmore by the amount of money we spend on sustainable food purchasing, it should be noted upfront that in order to reach 25%, we must be spending one quarter of annual food spend on sustainable products. While this seems like an obvious statement, it is worth phrasing explicitly, as it implies that reaching this goal has a cost. While our annual food spend fluctuates from year to year in the Dining Hall, an average based on sustainable food inventories from 2016-2018 was \$3,232,719.20. If 25% of this annual food spend must be dedicated to sustainable products, that means that Dining services should expect to pay roughly \$808,179.20 annually on sustainable products. To put this in perspective, from 2016-2018 we have averaged about \$316,981.40 in annual sustainable food spend. This means if we intend to reach 25% sustainable food procurement by 2025, we need to be spending roughly \$491,198.40 more on sustainable food annually within six years. The question then becomes, what products will we spend this money on?

## Methods

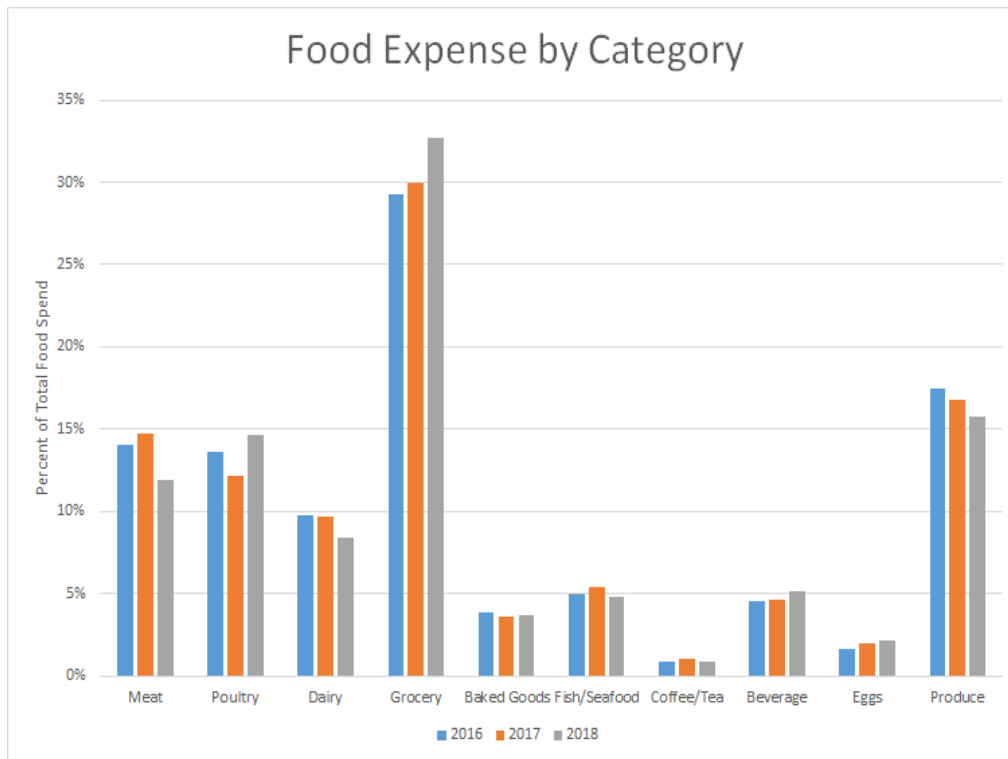
In order to provide educated guidance to Skidmore's Dining Services on how to best change their purchasing behavior for the greatest impact on the sustainable food percentage, we engaged in a targeted purchasing analysis. This involved identifying 15 to 20 products which could feasibly undergo complete and enduring shifts from conventional sources to sustainable sources. Feasibility in this regard meant items which the Dining Hall is currently purchasing (not new menu items), and items which would come in a familiar form (would not involve significantly more processing labor for the Dining Hall). Additionally, these items should be economically impactful, meaning they should be items which the Dining Hall serves very frequently and/or spends a large amount on. Ideally, these products should also be environmentally and socially impactful; products whose conventional equivalents are particularly resource intensive and/or products whose alternatives are far more humane and fair. Particular focus was given to items in categories with greater need for improvement, but all categories were investigated for potential candidates. These criteria we developed through conversations with Skidmore Sustainability Office staff and by interrogating

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previous food intern research. We conducted our analysis on inventory records kept for tracking sustainable food progress during the months of April, July, September, and October for the years 2015-2018. These “shoulder seasons” months represent the variability in purchasing and consumption in the Dining Hall throughout the year, while not overburdening sustainability staff with the task of keeping an inventory. General progress on category was obtained from inventory comparisons compiled by Sustainability Office staff, while specific item expenditure data was obtained from the 2017 inventory only (the only full year of data available at the time our research began). We first assembled a long list of 60 items from the above criteria, and recorded the number of orders, average cost per order, average cost per unit size, as well as the estimated annual total spent for that item. Then, we sought to find sustainable alternatives for each of those products, recording their average price per unit size. This data we obtained from existing suppliers with whom we work, or from other sources online when not available. By balancing unit sizes (in lbs., ounces, or otherwise) we then calculated a percent change in cost conventional to sustainable. This percent change was then applied to the annual spend of the conventional item to find an estimated cost for what the annual spend would be after a switch to a sustainable alternative. This annual expenditure per item could be expressed as a percentage of the total annual food spend to evaluate a particular item’s contribution toward the overall food purchasing goal (25%). This figure enabled us to compare products by their impact on the food goal, and select a few standout items which collectively would equate to 13.72% of all food purchases (the remaining percentage to 25%). It was our hope that this short list as well as the percent contribution for each item would reduce the analysis burden for Dining Services management and easily influence purchasing shifts. All analysis was performed using Microsoft Excel.

## Results

Inventory analysis by category shows us that consistently, the largest category on which we spend is ‘Grocery’; almost 30% of total expenditure-- twice as much as any other category. This is followed by ‘Produce’ (around 17%) and then three close behind: Meat, Poultry, and Dairy (between 10% and 14%). The other remaining categories are significantly smaller (see Figure 1). Category descriptions can be found in the appendix.



*Figure 2: Percent of Total Food Expenditure by Category, 2016-2018*

However, only about 1% of the 'Grocery' category is considered sustainable. Dairy has the highest percentage of sustainable purchases (usually over 3%). Poultry is strikingly lacking, never exceeding 0.47% in the past four years. In 2015, 1.64% of meat purchases were sustainable, but this number has steadily fallen to less than 1%. Produce, though the second highest expenditure has yet to exceed 2.23%. Most lacking in terms of sustainable percentages, are beverages and eggs, never surpassing 0.11%.

These numbers support the perspectives voiced by Dining Hall staff and Sustainable food interns. Much of the sustainable foods that Skidmore is able to buy is fresh produce, which is constrained to the growing season of the region. Non-perishable, processed, and other value-added products which would fall into the 'Grocery' category have been difficult to source sustainably. Animal proteins (including meat, poultry, and eggs) have been another consistent obstacle for sustainable purchasing, simply because of the large amount served in the Dining Hall and the relatively high price differential between conventional and sustainable options (though this represents a significant opportunity, as will be discussed shortly). Our success in regards to dairy is also frequently cited, mostly due to expansions of our sustainable

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food metrics to include Cabot (as a B-corporation) and Stewart's (as a local company using sustainable practices). Other observations on progress within categories made during the analysis included great work with seafood, for which many of our purchases were sustainable, with salmon and shrimp being notable exceptions (both were included in the targeted list). Successful transitions were also noted in the coffee and tea category, including a large amount of Colombian fair trade coffee.

Of the 60 items which we identified in the 2017 inventory using the criteria described above, we were able to find sustainable alternatives for all except three items (liquid eggs, Kaiser Rolls, and pesto sauce). Of the remaining items, 25 were available at wholesale prices from distributors who we currently buy from. Twenty-seven items were currently unavailable from our distributors but could be found online from sources we deemed acceptable, and at prices as close to wholesale prices as possible (though a few were only available at retail sizes and price). Wholesale products from current distributors on average cost 119% more than their conventional varieties, while retail/near wholesale products available online cost 244% more on average. All products saw an increase in price except for half and half creamer which was available for marginally cheaper from Stewart's Shops, though it should be noted that because prices fluctuate, other items could become price competitive with conventional varieties depending on seasonal and market changes or other factors. Products on the list ranged in estimated annual spend from \$1,614 to \$139,962 for conventional products, and from an estimated \$3,194 to \$314,684 for sustainable alternatives. Due to the great variety in annual expenditure on the product, as well as the change in cost from convention to sustainable alternatives, contributions to the overall sustainable food percentage ranged from 0.1% to 9.73% per item. The entire list of products can be found in the appendix, including current annual expenditure, percentage increase in cost for a sustainable alternative, estimated annual spend for a sustainable alternative, and contribution to the sustainable food percentage. Links to sources for these sustainable alternatives can be found in the full spreadsheet archived as a part of this project. We will highlight select items here.

The first items we should note are the animal proteins. Firstly, three chicken products showed great potential for complete switches due to their large annual



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expenditure (frequently served), as well as larger price difference between conventional and sustainable options. These products are chicken wings, chicken thigh, and chicken breast, all of which are available from Murray's Chicken in a variety of forms (skinless, boneless, IQF, etc.) and are all Certified Humane. Murray's chicken products are all raised and processed locally, never given antibiotics, and fed on a vegetable diet (not animal by-products). A complete shift to purchasing chicken wings from Murray's chicken would add 0.74% to the overall sustainable food percentage. A total shift with chicken thighs would add 2.01%, and chicken breast alone would add 9.73% to the overall percentage. These percentages follow from the expected increase in annual expenditure of \$8,426, \$36,924, and \$174,759 respectively.

Other animal proteins which should be noted are beef and pork products. Specifically, ground beef, pork butt, pork loin, and sausage. All of these products are available from the Headwater Food Hub from a variety of sources they work with. Sourced from FLX Beef and Autumn Harvest, ground beef is all grass-fed, grass-finished and Animal Welfare Approved. A switch to this sustainable source for ground beef would add 1.31% towards the sustainable food goal. Pork butt and pork loin are available through the Headwater Food Hub from Autumn's Harvest and Bostrom Farms Meat Market and are Animal Welfare Approved or Hormone Free. Each contribute 0.66% and 0.61% towards the sustainable food goal. Lastly, sausage is available from the Headwater Food Hub in many forms, such as Sweet Italian sausage, Breakfast sausage, Chorizo sausage, Kielbasa, Bratwurst, to name only a few. A complete switch of all sausages to sustainable options available through Headwater Food Hub would contribute 1.04% towards the food goal.

Other animal proteins of note include eggs. The only sustainable source from which we procure whole eggs is Barlette Farms. Of the \$5,887 spent on eggs during the 4 months tracked in 2017, only two orders totaling \$636 from Barlette Farm counted as sustainable. Whole eggs are available from the Headwater food hub through Autumn's Harvest that are fed with local non-GMO feed and are Animal Welfare Approved. A complete switch to whole eggs from the Headwater Food Hub would contribute 1.18% towards the sustainable food goal. Hard boiled eggs are another commonly used item in the Dining Hall with an annual expenditure close to \$5,487.

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Though not available from our current distributors, many suppliers offer organic, free-range and humane hard boiled eggs at retail prices online in packaging almost identical to those currently used. A complete switch to hardboiled eggs would amount to an addition of 2.22% towards the sustainable food goal.

Several cheeses came to afore during the analysis as candidates for complete switches. These were Feta cheese, American cheese, Cheddar cheese, and Monterey Jack cheese. Of these, Feta and Cheddar were both available from Headwater Food Hub. Feta is available from both cow and goat's milk, in and out of brine, from the Lively Run Dairy and First Light Farm and Creamery. Cheddar cheese is available as British (aged), Jersey gold, sharp, shredded, and in a variety of other flavors from the Muranda Cheese Company, Cooperstown Cheese Company, and Cuba Cheese Shoppe. Complete switches to Feta and Cheddar cheese would result in 0.71% and 1.22% additions to the sustainable food goal. Monterey Jack cheese was available through AZURE from Rumiano Family Cheeses in bulk packaging (5lb blocks). It is organic, non-GMO and free of artificial hormones. A complete switch to this Monterey Jack cheese would result in an added 0.83% towards the food goal. American cheese was available online from a variety of sustainable sources, though the only form which was white and pre-sliced was from Applegate Organics, and was sold in 5 oz packages (12 packages per case for bulk orders). A switch to this American cheese would result in a 2.35% addition to the sustainable food goal. Lastly, two other cheese products which are worth mentioning are cream cheese and Alfredo sauce. Neither of these products are available from our current distributors. However, sustainable alternatives could be found online. Organic cream cheese in 2 lb. tubs is available through AZURE from the Sierra Nevada Cheese Company. A switch to this cream cheese would contribute 0.6% to the sustainable food goal. Several Alfredo sauces are available online in a variety of forms, however, none were currently available prepared and frozen (as is currently bought from Sysco). Organic Alfredo sauce was available prepared and in jars from Bertolli, though not in bulk or at wholesale prices. Organic Alfredo sauce mix (a powder) was available in bulk from AZURE, though it was difficult to compare this item to the current product due to the difference in weight (powder vs. prepared sauce). A switch to jars of organic Alfredo sauce would contribute 1.12% towards the sustainable food goal, but this may be infeasible due to the packaging. If practices could be altered

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to accommodate an Alfredo sauce mix, the shift could be made with a positive, though undetermined impact on the food goal.

Two related products which showed significant potential for complete switches include Marinara sauce, and shredded Mozzarella cheese (for pizza). Both these products are available through the Headwater Food Hub. A complete switch to Marinara tomato sauce from the Farm Bridge in New Paltz, NY would account for a 1.24% addition to the sustainable food goal. Similarly, complete switch to a mozzarella cheese blend for pizza abstained from Headwater Food Hub would mean a 1.05% addition to the sustainable food goal.

Though we are doing well in procuring sustainable products in the dairy category, several non-dairy milks and other dairy products were identified as promising during the analysis. These included soy milk, almond milk, and ice cream. Only ice cream was available from one of our current suppliers (Stewart's Shops). Though we buy ice cream in a variety of forms in the Dining Hall (such as ice cream bars, sandwiches, pops, and mix), this analysis focused on regular ice cream of all flavors. Most of our ice cream of this variety is purchased from Hood through Sysco foods, totaling roughly \$18,387 per year. Some ice cream is purchased from Stewart's during the year, though it is included in milk purchases in the inventory and thus could not be isolated in the analysis. However, a complete switch from all other purchased ice cream to purchasing ice cream from Stewart's Shops would account for a 0.69% addition to the sustainable food goal. With the variety available from Stewart's, we found it difficult to imagine available flavors being an issue. Organic almond and soy milk were available in 32 and 64 oz. cartons sold by the case from several sources online. This presents another issue of packaging as some soy milk is put in dispenser in the Dining Hall which requires bags. However, if serving these milks by the carton was an option, they would account for 0.54% and 0.57% additions to the sustainable food goal respectively.

Exotic imports represented another area of potential for complete switches. These are products which will never be available locally (and thus are purchased year-round), whose conventional production and exportation industries are known to be

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environmentally harmful and exploitative. For this reason, organic and fair-trade certified alternatives for these products present opportunities for switches. Our analysis identified avocados, bananas, and mangos as prime targets for complete switches. Both certified organic and fair-trade avocados and bananas are available from Equal Exchange in bulk. Switching to these sources represent 1.02% and 0.48% additions to the sustainable food goal. While no frozen mango chunks (the form currently used by the Dining Hall) are available online from a fair-trade source, organic frozen mango chunks are available from NW Wild Foods in bulk. A switch to this source for mangos would represent a 0.93% addition to the sustainable food goal. A related exotic import product is chocolate, and in particular, chocolate chips. A certified fair trade semi-sweet chocolate chip that is made from organic raw cane sugar, chocolate liquor and cocoa butter is also available from equal exchange. A complete switch to these chocolate chips would account for a 1.18% addition to the food goal.

Looking more locally, we felt that while local produce was important to continue taking advantage of in season, there were other local products which are more available during the entire year and thus could be potentials for purchasing shifts. These were mushrooms and maple syrup. The Dining Hall uses a variety of mushroom species, including Portobello, Shitake, Oyster, and sliced White or Crimini mushrooms. Luckily, these species and many more are available from growers locally through the Headwater Food Hub from suppliers such as Kennet Square Specialties, Tivoli Mushroom, Fruit of the Fungi and Leap Foods. A complete switch to mushrooms from these suppliers would mean a 1% addition towards the food goal. Similarly, the Dining Hall uses a variety of syrups, listed in inventories as either maple, pancake or waffle syrup. Maple syrup is available from Wohlschlegel's Naples Maple Farm through the Headwater Food Hub. A complete switch to this Maple Syrup would represent a 0.75% addition to the sustainable food goal.

Other pantry items which are less visible to diners but still an equally significant portion of the Dining Hall's food spend are flour and canola oil. These items accounted for roughly \$13,770 and \$16,527 in annual expenditure. The Dining Hall purchases its flour (both unbleached and hi-gluten) almost entirely through Sysco food but under various brands including Gold Medal, Hummer, Casasol and Rex Royal. In 2017, only

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one order of \$58.60 was purchased of sustainable all-purpose unbleached flour. A great variety of flours are available through the Headwater Food Hub, including certified organic white, whole wheat, as well as many others such as Rye, Spelt, Buckwheat and Einkorn. A complete switch to flour from Headwater Food Hub would allow a 1.38% addition to the food goal. Through canola oil was not available through our current distributors, an organic option was available in bulk (17.5 L jug) online. A complete switch to canola oil from this source would represent a 0.93% addition to the food goal.

Two other very commonly served items in the Dining Hall are hamburger buns and potato fries (French fries, waffle fries, spiral fries, and steak fries). Potato fries are entire sourced from Sysco, however both crinkle and straight cut fries are available from Martens Fresh through the Headwater Food Hub. In addition to white potato fries, they also have butternut fries, beet fries, and sweet potato fries. A complete switch to French fries of potato fries from this source would account for a 2.52% addition to the food goal. Though not available from our current distributors, organic hamburger buns are available online in the same size and packaging as those currently purchased by the Dining Hall (largely from Sysco or Bimbo Foods). Hamburger buns are available from the Vermont Baking Company, though prices could not be acquired. However, based on prices available for organic hamburger buns elsewhere online, a complete switch to sustainable hamburger buns would represent a 0.64% addition to the food goal.

Lastly, while progress in the fish/seafood category has been promising, two species have been notable exceptions and could be improved upon. These are salmon and shrimp. Each accounted for \$31,302 and \$47,883 in annual expenditure in 2017. A wild caught Silver Salmon filet (a sustainable option based on recommendations in the Monterey Bay Aquarium Seafood Watch) was available online from Northwest Wild Foods. A complete switch to salmon from the source would represent a 3.79% addition to the sustainable food goal. Though not available in wholesale options, Key West wild caught uncooked pink shrimp was available online through Whole Foods. A complete switch to sustainable shrimp from this source would represent a 5.56% addition to the food goal. This percentage is likely inflated due to the higher price of Whole Foods

shrimp, however, a complete switch to sustainable shrimp would still have a significant impact on the food goal if a more reasonable wholesale option were to be found.

While other products all showed some potential for switches, the products highlighted in this section represent those with the greatest potential for their ease of adoption, reduction of impact by moving away from harmful conventional varieties, visibility for diners aware of sustainable food issues, and overall impact on the sustainable food goal. Hopefully the variety of options presented here allow for a selection of switches to be strategically implemented over the next six years that will together make up the difference to 25%. For example, if the Dining Hall were to focus on only two 'big-ticket' meat products, a complete switch to sustainable chicken breast and salmon would collectively achieve a 13.52% addition to the food goal-- just under the 13.72% to 25% from the 2018 percentage. However, a more well-rounded approach to purchasing shifts might look something like the following:

*Table 2: Example combination of products to meet sustainable food goal.*

<u>Food Product</u>	<u>Contribution to Sustainable Food Percentage</u>
Bananas	0.48%
Chicken Thigh	2.01%
Eggs	1.18%
Flour	1.38%
Ground Beef	1.31%
Marinara Sauce	1.24%
Mozzarella blend	1.05%
Maple Syrup	0.75%
Canola oil	0.93%
Hard Boiled Eggs	2.22%
Frozen Mango	0.93%
Ice Cream	0.69%
<b>TOTAL</b>	<b>14.17%</b>



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We leave it to Dining Services to find the right combination of purchasing shifts to achieve their goals. Hopefully the information presented above will aid in this effort. One final note-- the prices for these products are liable to change, so the numbers presented in this analysis should not be taken as exact, but more as a well-informed estimates on magnitude of impact. Additionally, other sources for products may be available or become available as the market for sustainable foods grows. These products should be sought or even encouraged through the relationships Skidmore will be building by purchasing from committed sustainable food producers and distributors. As more plentiful and affordable options become available, these can be taken advantage of as they may create opportunities for more funding to be channeled into new sustainable food options. In this way, Skidmore Dining Services can be a crucial piece in growing a sustainable food system in the region.

### ***Plant-Biased Buffet***

#### **Background**

There is evidence in the study of hospitality and nutrition management that suggests not all decisions made in the dining setting are informed or even conscious. Rather, there are a multitude of variables which the diner is balancing at all times that dictate what kinds and how much food one takes. For example, a 2004 study by Brian Wansink of Cornell University found that environmental factors such as package size, plate shape, lighting, socializing, and variety can all influence diners in a self-serve scenario. Although these environmental factors may appear unrelated, they can inhibit consumption monitoring and promote “alternative consumption norms” that determine consumption volume (Wansink, 2004). A 2012 study of elementary school-aged children found that attractively named food increased consumption 100% over the same item with a more generic name (ex. “X-ray Carrots” over “Food of the Day”) (Wansink et al., 2012). Shin and Mattila (2009) found that depending on gender and health consciousness, the perceived ‘healthiness’ or ‘sustainability’ of food choices can impact subsequent food choices in a given meal. Along these same lines, other researchers have found that the presence of certain “trigger” foods can strongly increase the sales of unhealthy à la carte options, even when the trigger foods are not

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selected (Hanks et al., 2012). These studies have real impact because these observable tendencies can be leveraged for a desired result. For example, a high school cafeteria buffet which was biased in convenience towards healthy food nudged students to consume fewer unhealthy foods (27.9% less) (Hanks et al, 2012). Again, in a hotel conference breakfast buffet, researchers found that convenience in terms of order determined diners self-serve decisions greatly: Over 75% of diners selected the first food they saw, and the first three foods a person encountered in the buffet comprised 66% of all the foods they took. In fact, serving the less healthy foods first led diners to take 31% more total food items, and they more frequently chose less healthy foods in combinations. Thus, rearranging food order from healthiest to least healthy can nudge unknowing or even resistant diners toward a healthier meal (Wansink, 2013). This “first foods most” concept has a myriad of applications beyond health. In fact, both Smith and Amherst College have utilized this concept for sustainability by presenting meat options at the end of their buffet lines in on-campus cafeterias. This nudges students to fill up their plates on grains and vegetables before meat, ultimately reducing the amount of meat the Dining Hall must purchase, prepare, and serve. Noting the work by Smith and Amherst, this tactic was the first of four recommendations offered by food interns Phoebe Martell-Crawford and Sydney Gellerman in the Fall of 2017. In order to test this phenomena in Skidmore’s context, we sought to conduct an experiment changing the order of meats in the Diner station of the Dining Hall to observe the difference in both consumption and waste.

## Methods

We chose to conduct our experiment during dinner (5-8pm) at the Diner station within the Murray-Atkins Dining Hall at Skidmore College. We determined this time and station to be the best because the Diner station (which is the most akin to a traditional buffet line) typically offers two self-serve meats on either side of the line. The experiment consisted of two trials, each with its own control (meat at the beginning of the buffet line) and variable (meat at the end of the buffet line). Vital to the experiment, we were reassured that this exact meal would be replicated and offered one month from then (so that we would be able to test our variable and move the meats to the back of the buffet line). During the experiment, we collected post-consumer waste of the meat served at Diner. This was done in the dish room

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unbeknownst to the consumer so as to not affect their decision making when serving themselves proportions of meat. At 8pm, we weighed the separate food wastes, as well as the leftover trays of meat (yet unserved). The Dining Hall informed us how much meat was prepared. This allowed us to calculate how much of each meat was left over, how much was taken, and how much was wasted.

One month later we ran our variable experiment. Meat dishes which were at the start of the buffet line during the control were placed at the end of the line (furthest away from the plates). Similarly, we stationed ourselves in the dish room to measure post-consumer waste. At the end of dinner, we weighed the leftover trays in order to calculate how much was served in proportion to how much was wasted.

To ensure that our results were comprehensive and not circumstantial, we conducted a second trial; the second control was held around two weeks after the first control, and the second variable was held around two weeks after the first variable. We ran both trials exactly the same, acquiring the total number of each meat that was prepared, measuring the amount of food wasted, and accounting for the trays of food leftover. Similarly, we accounted for the number of diners that ate in the Dining Hall during dinner on the days we conducted these experiments. The menu for each trial can be found in the appendices.

## Results

Our results for both trials are nearly identical, as can be seen in Figure 2. The orange bars are representative of the controls where the meat was placed at the beginning of the buffet line. The green and blue bars represent the variables where the meat was placed at the end of the buffet line. We took the total amount of meat prepared, taken, and wasted and divided each by the total number of diners (people that swiped into the Dining Hall between 5-8pm). While we were trying to reduce the amount of meat taken by changing its location on the buffet line, we unfortunately saw no significant difference. For the first trial, beef and chicken were served. Even though the number of diners for the control and variable experiments were almost the same (around 1,000 people), more beef was prepared for the variable compared to the control. Since more beef was prepared, more was eaten and wasted. Similarly more chicken was prepared for the control compared to the variable so more was eaten and wasted. These results are concurrent with trial 2. It is possible that the buffet line is

too short to see a significant change in consumer behavior concerning meat consumption.

However, in conducting our meat food waste audit, we determined that there is a substantial amount of post-consumer food waste. For trial 1, a total of 56.2 lbs. of meat was wasted just from the Diner from only two dinners. For trial 2, 30.3 lbs. of meat was wasted. This study suggests that the most effective efforts on reducing meat consumption may have to be made behind the scenes. This may involve offering more alternative plant-based proteins, and/or reducing the frequency of more impactful meats (such as red meats) on the menu. This not only saves the Dining Hall money since less meat is being bought but it also lessens the environmental impact of the Dining Hall. Accordingly, it is important that the Dining Hall continues to remain tray-less and continue to pre-plate food to control consumption and reduce waste.

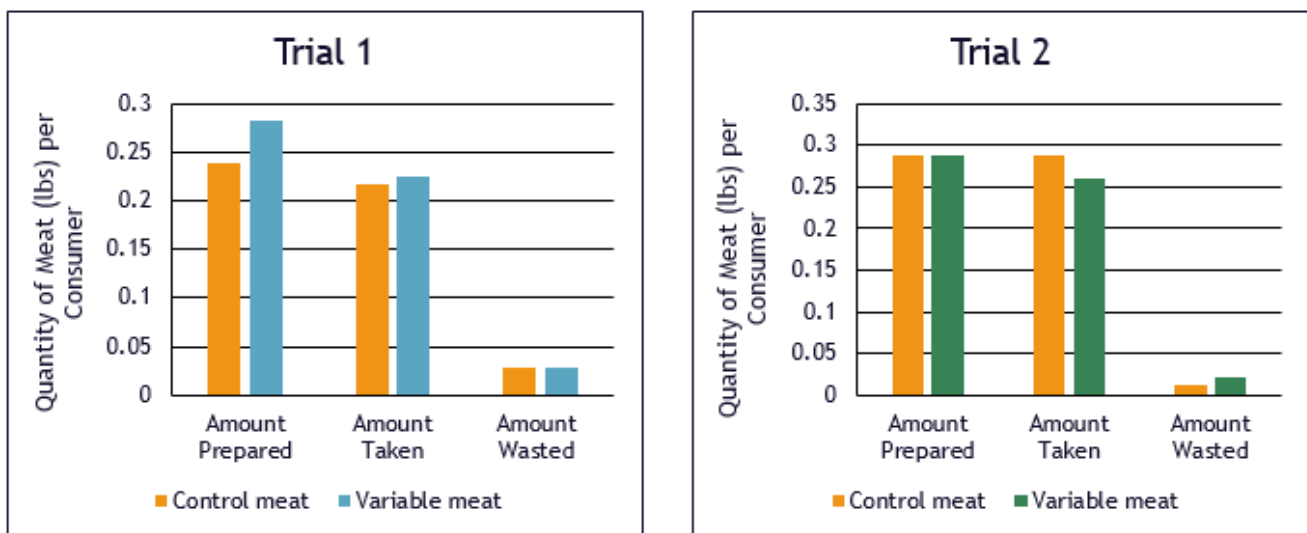


Figure 3: Results from Trials 1 and 2 of Plant-Biased Buffet experiment.

## Food Waste Management System

### Background

According to the 2018 Food Waste Audit conducted by the Skidmore Sustainability Office, roughly 350 lbs. of food is wasted by diners in the Murray-Atkins Dining Hall every day (Skidmore College Sustainability Office, 2018). This is not an issue specific to Skidmore; In the United States, almost 40% of all food is wasted (Gunders, 2017). When speaking with representatives from other peer and aspirant institutions in the region during our preliminary research, food waste reduction efforts were a

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commonly cited initiative. Food waste is so problematic because it both has tremendous environmental impact but also represents significant financial loss; when a plate of edible food is wasted, all the water, nutrient, and energy resources that went into its production are also wasted, in addition to the profits it could have earned. For these reasons, it is appropriate to focus on the issue at Skidmore. Furthermore, the issue of food waste prevention in the college setting is important because the formative habits which students develop during their time in school may continue to have an impact long after their studies.

### Methods

In order to find cost-saving solutions to the food waste problem at Skidmore, we noted the efforts and experiences surrounding food waste in our conversations with college and university dining services in the region. We also had in-depth conversations with Dining Services management at Skidmore to hear their perspective on their current efforts, ongoing issues, and their ideas for solutions. We spoke with Sustainability Office staff members to gain an understanding of their efforts to reduce food waste through education/outreach to the student body, as well as integrating the compost system to dining services operations. In addition, we analyzed previous food intern research to gain an understanding of what student perspectives and knowledge exist on food waste in the Dining Hall. After this, we scanned the field of companies involved in the food waste management industry and targeted those with experience in university dining services, and selected the one company which fit our needs most. With numbers obtained from Skidmore Dining Services, we were able to get a quote for a food waste management system from this company including expected cost of the system and savings from reduced food waste, as well as some visual representations of what such a system would look like. Lastly, we used some of what we learned in this research to investigate how creating a similar system of our own would compare to the contracted system.

### Results

Our conversations with Dining Services revealed that the Dining Services management, like other college dining services, considers food waste to be a pervasive issue. They have taken many steps in line with other schools in the region to address

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the problem, such as tray-less dining, pre-plated and cook-to-order options. Composting in the back-of-house (pre-consumer) operations has been a major success and has diverted thousands of pounds of waste from the landfill. However, other similar institutions in the region have taken further steps to institute composting in their dining halls in both pre and post-consumer scenarios. Through our conversations with the Skidmore Sustainability Office, we learned this this remains an objective of the office in the coming years. It emerged from our meetings on this topic that Dining Services felt accomplished on their pre-consumer food waste reduction efforts, but that despite some period efforts to counter it, post-consumer waste has remained problematic. We also heard from multiple sources in our conversations with other schools that while they felt their education and outreach efforts were important to their mission, they did not always have direct impacts on diners' decisions in the Dining Hall. Even with signage and events around the Dining Hall, diners continued to take more than they could eat and produce enormous amounts of food waste. The schools that had been most successful in managing food waste had made significant efforts to track in detail when, how much, and what kind of food waste they were producing. This data helped Dining Services target and respond overproduction more quickly, as well as tailor their education campaigns most effectively. While some schools record data of this kind by hand (as Skidmore does), the most effective schools had transitioned to computerized food waste management systems. These systems allowed kitchen staff to easily record, store, manipulate, and learn from data on their food waste production. Boston College in particular experienced dramatic reductions in food waste by using such a system (60% in 12 months) (FINE, 2015). While some institutions utilized food waste management systems provided by their food service providers, self-operated dining services (such as Boston College) used contracted systems. One such company offering food waste reduction solutions is LeanPath.

Leanpath provides a variety of systems for both pre and post-consumer that integrate tracking systems, an analytics platform, and behavior change tools for a detailed, and comprehensive management solution. Tracking systems designed for both front and back-of-house allow kitchen staff and/or diners to record their food waste. In the kitchen this looks like a streamlined scale, touch-screen interface and camera that captures what food is being thrown out and how much it weighs. In the



front-of-house, the system combines a bin where diners deposit their food waste with a scale and attached digital monitor that displays the food weight waste along with slides comparing that waste to equivalent resources (like water, soil, or fuel), connections to food insecurity (who could have been fed by this waste food), as well as a calls to action (“you can make the change”). Data recorded from both these sources is channeled to a cloud-based analytics platform designed for managers to be able to easily interpret incoming data in real time. Lastly, the system incorporates behavior change tools, such as alerts to data points that exceed designated limits or expected results based on historical trends, and incentives to kitchen staff who consistently record waste (Meyers, Pers. Comm.).



Figure 4: LeanPath tracking station

Leanpath analytics platform

Leanpath behavior change tools

An audit conducted by LeanPath on five universities utilizing their post-consumer systems only revealed that prior to installation, diners were wasting nearly  $\frac{1}{3}$  of the food they served themselves. After installation, these schools on average witnessed a 37% reduction in waste, as well as increases in awareness of and confidence to change food waste habits among the student body. Dining services at these institutions realized 3-8% savings from these reductions in food waste, translating to a 5-15% return on investment for the system (Meyers, Pers. Comm.). Conversations with LeanPath revealed that pricing for such a system would be flexible, and a good estimate of cost would be between \$8,000 and \$10,000 annually, with a minimum two-year contract. Given the number of diners Dining Services serves, the degree of batch cooking done in kitchen, the total food spend and percent of food

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costs in the overall budget, LeanPath estimated that annual expected savings from installing the system would be \$317,235.04.

While this number is impressive, the ongoing costs of the system are still significant. During our conversations, we came to understand that while Dining Services is receptive to the LeanPath food waste management system, upfront costs present a challenge, especially during a time when budget cuts across campus are tightening operations. For this reason, we sought to explore alternatives to the LeanPath system that could achieve similar results. Research on the food waste management industry revealed that no other competitors with similar depth or experience exist in the US (Winnow Solutions offers a similarly comprehensive system but is based in the UK). Some food service companies, such as Bon Appétit and Sodexo, have food waste management systems incorporated into their service, but as Skidmore Dining Services is self-operated, this is not an option. Presented with these realities, we sought to compare the contracted food waste management system with a solution built at Skidmore. Based on the basic outline of a post-consumer tracking system with a behavior change-oriented monitor, we estimated the costs of producing such a system here at Skidmore. We imaged a cabinet enclosure to conceal the food waste receptacle, a scale with a basic Raspberry Pi and Arduino mini computing kit for facilitating connection to a digital display monitor. This system would be placed in the Dining Hall before the accumulator, where diners would empty their plates of food waste before depositing their cutlery and dishes, allowing them the tangible experience of scraping their waste (something which we as researchers have observed to be an effective tool in discouraging food waste), combined with the quantitative display of food waste data on the monitor. Estimated costs for the system are shown in the table below:

*Table 3: Breakdown of estimated costs for a Skidmore-made food waste management system*

<u>Item</u>	<u># of Units</u>	<u>Cost per Unit</u>	<u>Total Cost</u>
Cabinet	1	\$ 250.00	\$ 250.00
Raspberry Pi and Arduino Startup Kit	1	\$ 100.00	\$ 100.00
Monitor	1	\$ 100.00	\$ 100.00

Scale	1	\$ 150.00	\$ 150.00
32-gallon Trash Can with Lid and Dolly	2	\$ 50.00	\$ 100.00
			<b>\$ 700.00</b>

This estimate does not include labor costs, as we postulated that such a project would make for an excellent collaboration between a computer science student and a motivated Food Intern or faculty member. Even if labor costs were to be included, the total price of the system is dramatically reduced from the LeanPath system (less than 1/10). Although not as comprehensive, this system would address what we know to be a driving source of food waste in the Dining Hall (diners’ habits), and would be free of contractual obligations, allowing us the freedom to modify the system as we see fit.

Quoting the energy manager’s maxim: “You cannot manage what you don’t measure.” For food waste, this philosophy is especially pertinent. If we wish to realize potential savings from reducing our food waste at Skidmore, data on our food waste production is critical. However, this data is useless without meaningful action to implemented changes based on such information. A food waste management system in the Dining Hall would allow us to better understand the waste we produce, target that food waste through future waste reductions efforts, and use that data to motivate diners to change their habits. The degree and depth to which each of these would be realized is different depending on which system if adopted. It is obvious that the LeanPath system is far more comprehensive than anything we could produce at Skidmore, and would likely have a greater impact. However, we believe that a Skidmore-made food waste management system presents a viable and more economical alternative. There remains the challenge of upkeep and updating such a system without the support offered through the LeanPath contract, but our own custom system could be a good starting point and/or pilot for transitioning to a more involved system farther down the road. Based on the experience of other schools and experts in the industry, any system that we install is better than inaction, where real results can be anticipated.

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## ***Intensive On-Campus Production***

### **Background**

While a large part of our project aimed to support local farmers by buying sustainable food, we also sought to explore ways that would make Skidmore College more resilient and self-sufficient. Our current on-campus food production comes from the Skidmore Community Garden, which produces around 1,100 lbs. annually, as stated above (Skidmore College Sustainability Office, 2019). This is very little compared to the demands of the Dining Hall. Due to our Northeastern geographic location the garden cannot produce during the Winter or Spring months. Therefore, the Dining Hall benefits most during the Summer and some in the early Fall, when there is a significantly smaller student population on campus. To be more impactful, we determined that on-campus food production must be year-round and must produce enough to sustain the needs of the Dining Hall during the academic year.

One possible solution that we identified was a Freight Farm. A Freight Farm is a shipping container that has been modified for the purpose of creating year-round agriculture in any environment. 'Greenery', the newest model offered by the company Freight Farm, uses an alternative method of farming: hydroponics. This means that crops are grown without soil or sunlight; instead, they are grown in nutrient-rich water bases with LED grow lights. The interior of the farm allows for vertical and horizontal beds, maximizing the space to produce as much as possible. Due to its resource and space efficiency, the Freight Farm has the potential to far exceed that of the Skidmore Community Garden, as well as being an educational opportunity for the campus community. For these reasons, the Freight Farm presented a possible avenue for intensive on campus production. Images of the exterior and interior of the indoor hydroponic farm are shown below.



*Figure 5: Interior and Exterior of the Freight Farm*

## Methods

To predict the feasibility of the Freight Farm at Skidmore, we conducted a financial analysis to determine payback period under a few different scenarios. This included annual operating costs, capital costs, and labor. These prices we determined by speaking to Freight Farm representatives, current Freight Farm operators, and Dining Services. We also reached out to institutions in the area that currently have operating Freight Farms to learn more about its intangible impacts. Stony Brooks University, Clark University, RPI, and even the company, Sodexo, have invested in a Freight Farm. We were curious about student involvement and the ease of implementation and operation. We emailed and spoke over the phone with the individuals involved with these Freight Farms.

The Freight Farm specializes in leafy greens and different lettuces. In order to begin our feasibility study of procuring a Freight Farm, we had to determine which of our leafy greens (that we consistently serve in the Dining Hall) would be able to be grown in the farm. This information we also acquired from Freight Farm representatives and current Freight Farm operators.

## Results

We found that almost all of our leafy greens could be replicated in the farm, including arugula, kale, baby kale, swiss chard, iceberg, romaine, and other salad blends. All of these have been proven to grow efficiently in the Freight Farm (Freight

Farm, 2019). We found that we spend \$58,324.80 for 25,056 lbs. of lettuces each year. After talking with representatives from Freight Farms, as well as students who run Freight Farms at other schools, we concluded that the upfront cost of a Freight Farm would be \$113,700 and could be expected to produce 41,600 lbs. of lettuce yearly, which is equivalent to one acre of farm production. The total cost of seeds for these leafy greens is \$45 per month. The total monthly cost of electricity is \$330, while water is only \$3, and soil plugs are \$61, (according to resource use information provided by Freight Farms and utility costs at Skidmore College).

We then determined the cost of person power by conducting three different scenarios: hiring a part-time worker (dedicated to 15-20 hours per week at \$15 per hour), a full-time worker (with an annual salary of \$35K + benefits) and a full-time worker with a shared appointment. The table below displays the annual operating costs, annual saving, and the payback period associated with each different hire.

*Table 4: Payback Period of Freight Farm Based on Varying Person Power*

<b>Freight Farm Worker</b>	<i>Part-Time Hire</i>	<i>Shared Full-Time Hire</i>	<i>Full-Time Hire</i>
<b>Annual Operating Costs</b>	\$19,668.00	\$29,237.76	\$53,217.96
<b>Annual Savings</b>	\$38,656.80	\$29,081.80	\$5,106.80
<b>Payback Period</b>	3 years	4 years	>10 years

Hiring a full-time worker would be most impactful for the Dining Hall. This person could lead sustainability efforts in the Dining Hall acting as a liaison between Dining Services and the Sustainability Office. We found that this position was consistent throughout aspirant colleges such as Middlebury and Wesleyan, all of whom had more successful sustainable food efforts than Skidmore because of a dedicated hire. However, the most feasible option is to hire a shared full-time worker. Since the Freight Farm produces almost twice as much as the Dining Hall needs (what is needed for the Dining Hall is only 60% of the Freight Farm’s production), we could share the indoor farm with another institution, such as those who have expressed interest in our Sustainable Food Purchasing Network. This payback is within four years. If the Dining Hall did not wish to share the Freight Farm with another institution, then the additional



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greens could be sold to CSA shares offered by 9 Miles East Farm or even directly to students, faculty, and staff around campus.

Not only would a Freight Farm save the Dining Hall a lot of money and contribute greatly to the sustainable food goal, it also offers positive intangibles. First, there is improved food safety with hydroponics, which would make selling more viable. Second, it offers educational opportunities on campus, especially for first year student workers who are required to work in the Dining Hall. They could choose to work some of their shifts in the Freight Farm and thus learn about hydroponics. These workers could experience where some of the food that is served in the Dining Hall is coming from. Third, Environmental Studies and Sciences, Biology, and other related departmental courses could utilize the farm for experiential visits and other learning opportunities. This leads us to believe, that under any scenario, a Freight Farm would not only be a highly profitable endeavor, but an educational asset for the college.

### ***Sustainable Food Purchasing Network***

#### **Background**

Skidmore Dining Services' ability to procure sustainable food is contingent on the capacity of sustainable food producers to supply its needs. While there may be enough farms in the area to supply the demand, coordination between individual producers and Dining Services is a laborious task for both entities. Distributors who specialize in local and sustainable foods make this job far easier. Antonucci's has been a reliable supplier for Dining Services in the area of produce and seafood. However, their catalog is limited and is not entirely devoted to sustainable foods. Over the past few years, Skidmore Dining Services has begun to work with the Headwater Food Hub (HFH) which works collaboratively with a network of regional farmers and food producers to coordinate a Good Food System that delivers top-quality, sustainable foods year-round. HFH is connecting the dots of Farm to Table and brings transparency and integrity to the food supply chain. They focus on the "to" in Farm to Table, emphasizing the importance in communication and collaboration between the farmers and the distributors. While Skidmore has maintained a good relationship with HFH, our business has been tenuous at times. Skidmore is not always able to buy as much as HFH would like, and since HFH is based in Rochester, NY, they would prefer that the delivery truck to Skidmore in Saratoga Springs is decently full, making the trip

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worth it. As researchers, we recognize the value of this relationship, and in an effort to ensure the continued availability of sustainable foods, as well as the positive impacts the company is having on the larger food system, we decided to reach out to companies, organizations, and schools in the Saratoga area to gauge interest in a regional purchasing network. By building a market for sustainable foods and possibly incorporating more groups into the delivery route to Saratoga Springs, we would be securing a supply of sustainable foods for Skidmore while also potentially lowering prices for interested partners.

## Methods

In an effort to build a network of institutions in the Saratoga area that are committed to sustainable foods, we targeted large institutions with dining services within close proximity to Skidmore's campus. Beyond this immediate vicinity, we focused on key local institutions in industries identified through conversations with our current sustainable food distributors, as well as the Skidmore Sustainability Office. The industries included hotels, hospitals, schools, large restaurants (or restaurant chains), retirement homes, and large local employers with cafeterias. Once a long list was assembled, we contacted these local institutions by email, over the phone, and in person when possible. We approached these institutions hoping to learn more about their values, practices, and difficulties surrounding sustainable food, and probed their interest in become more involved with sustainable food in the area. Once a relationship was established, we relayed to them the purpose of our research relating to Skidmore's sustainable food goal, and explained our current practices and difficulties with purchasing sustainable food. Finally, we invited interested parties from these key sectors to an informational meeting in the Skidmore's Murray-Atkins Dining Hall to learn from each other's experiences in purchasing local food, as well as get some perspectives from distributors who work with sustainable foods. We asked each representative at the meeting to share some about the values of their institution surrounding sustainable food, their current practices or experiences, some challenges they may have faced, and what sorts of goals they have. During the meeting, we took notes on the kinds of themes that emerged along with specific anecdotal evidence. With this meeting, we wanted to start a conversation around purchasing sustainable food in the Saratoga area without forcing these institutions into any commitments. It

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was our hope that relationships built in this process would be the foundation of a sustainable food purchasing network, securing Skidmore's relationship with our current sustainable food distributors and more broadly, building a more sustainable food system in the Saratoga area. Before the meeting ended, we collected everyone's contact information so that we would later be able to connect everyone on a single email chain. This email chain served as a resource to keep those who were interested in further pursuing this purchasing network in contact. We also opened it up to those involved to invite more interested parties into the conversation.

## Results

We had some difficulty contacting institutions because of slow responses, or complete unresponsiveness. We found that often arriving in person was the best way to get ahold of representatives. We also struggled to get in touch with the right person at each of these institutions-- often the ones responsible for food purchasing were the busiest and could not be tracked down. Those that did respond were often very interested, but hesitant to committing to a meeting or other further involvement. Table 4 below displays those who were contacted, those who were interested, and those who finally did attend the meeting. We had a total of six interested parties attend the meeting as well as representatives from Skidmore Dining Services and Sustainability Office staff. The meeting lasted almost two hours and followed a loose structure based on the posed questions described above.

Overall there was a common understanding of the value of sustainable food. This common understanding encompassed the entire breadth of sustainability, including attention to the environment, local/international community development, economic stability, in addition to individual health and well-being. Similarly, we found that many people expressed a deeper meaning of food, whether it be caring for the health of patients at the hospital, nurturing students at school, or connecting diners with the farms and landscapes where their food comes from. In this way, participants saw food as a vessel for imparting values and knowledge.

Challenges that were voiced echoed those held by Skidmore's Dining Services, having mostly to do with affordability and accessibility. Sustainable food is often more expensive, especially those with the certifications necessary to be certain of the producer's practices. While there may be a desire on the part of institutions to

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increase their sustainable food procurement, ultimately their purchasing decisions were constrained by a need for revenue. Keeping their institution financially stable was the priority over acquiring sustainable food. Grants from public or other private institutions were of great help in this regard (such New York's 2018 law offering reimbursements to schools spending over 30% of food purchases on New York State foods). However, in upstate New York local produce is largely seasonal and institutions are limited in product availability by seasonal shifts. This is especially a problem for the schools at the meeting where students are not in session in the peak of the growing season. For many institutions that served large numbers, it was difficult to get a large enough quantity to meet their demand reliably, and/or get food that met food safety standards (as dictated by law or by institutional standards). Some institutions, such as Saratoga Hospital, had been incorporated into purchasing groups to ensure quality and quantity while reducing costs and streamlining ordering. However, these groups were coordinated by industry (in this case, hospitals in the Capitol Region) and thus were not localized or value-oriented. It was expressed that these groups were ultimately a failure because of a differing values, and Saratoga Hospital pulled out. Other institutions expressed a lack of autonomy in food purchasing due to contractual obligations with food service providers. Contractual obligations actually prohibited the Wesley community from participating in the meeting. Self-operated institutions had much more freedom, but still faced difficulties. In the end, it was expressed that if sustainable foods are to be used readily by institutions, the job of coordinating with producers/distributors of food products that meet quantity and quality needs requires a specific person/position to be specifically dedicated to it. Without this dedication, conventional varieties become the default. This situation is equally difficult for farmers because they are often busy with other farm tasks. If potential buyers are deterred, the overall market shrinks, and producers' growth is limited by what the market affords.

An interesting point brought up during the conversation related to customer satisfaction. While the satisfaction of customers was held in high regard when considering sustainable food options and often helped encourage procurement, it became problematic when customers desires conflicted with sustainable practices. For example, at the Dining Hall, Chicken Finger Friday is a popular feature of the menu, however the practice negatively impacts our sustainable food procurement by

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boosting consumption of animal products which are as of yet sourced unsustainably. Because of institutions' role in catering to both the physical and emotional well-being of customers, sustainable foods can act as sticking points when customs conflict with sustainable consumption. It was agreed that this is a fine balance and there is no easy answer for defining the responsibility of institutions here.

Finally, we discussed what everyone hoped to see in the future with sustainable food procurement in the local area. We posed the question to them: How can we work together to increase sustainable food procurement? While we envisioned a sustainable food purchasing network that might allow for more streamlined ordering, better prices and overall increased availability and visibility of sustainable food in the local area, we wanted to hear what these institutions saw for the future. While there was consensus that conversations and partnerships should continue, there was no coherent vision articulated in the meeting. None of the representatives present emerged as a potential leader who would feel passionate or motivated to facilitate a network. However, it became apparent that the distributors in the room like Antonucci's and Headwater Food Hub were invested in and set on providing increased sustainable foods to the area. In fact, both businesses were offering a lot of services that could fulfill the demand of these institutions, though in markedly different ways. Overall, the topics of coordination, accessibility and affordability were well addressed in the business model of food hubs like Headwater and there was excitement in the room about the potentials of such an organization. While representatives were knowledgeable on the difficulties of procuring sustainable food, when it came to changing to food system for the better, many people deferred to the distributors, in particular Headwater Food Hub, as sources of expertise. We recognize that with the motivation of businesses and the duties of all the representatives in the meeting, coordination of future sustainable food procurement might be best tackled by distributors. Nevertheless, knowledge sharing and collaboration among institutions buying sustainable foods will be an important part of the growing a sustainable food system in the area. While we will not be able to continue in those conversations after this year, it is our hope that this meeting allowed for the connected parties to collaborate in whatever capacity possible moving forward.

**Table 5: List of organizations included in sustainable food purchasing network outreach**

Potential Partner Organization	Interest	Attendance at Meeting
Saratoga Springs School District	Yes	Yes
The Wesley Community	Yes	No
Saratoga Hospital	Yes	Yes
DZ Restaurants	Unresponsive	No
Saratoga Independent School	Yes	Yes
Wheatfields Restaurant	Yes	No
9 Miles East	Yes	Yes
Courtyard by Marriott (Hotel), Saratoga Springs	No	No
Antonucci's Foods	Yes	Yes
Headwater Food Hub	Yes	Yes
The Adelphi Hotel	Yes	No
Prestwick Chase at Saratoga	No	No

## **Discussion**

While the projects presented in this report may seem disparate, it is important to remember that they were all chosen for their potential impacts on Skidmore's sustainable food goal. Their impacts cannot all be described numerically, for some are difficult to quantify at this moment in time, or have more important intangible results. However, each plays a part towards achieving the sustainable food goal, and pursuing any of these projects in isolation would be missing the point.

For example, from the estimates of cost and savings of the food waste management system obtained from LeanPath and intensive on-campus production system obtained from Freight Farms, it can be demonstrated that the anticipated increase in expenditure necessary to reach 25% sustainable food procurement can be neutralized by 2027 (shown below). From 2027 onwards, these projects will continue

to generate revenue, hopefully making up for the gap in expenditure not recouped by the projects in 2025.

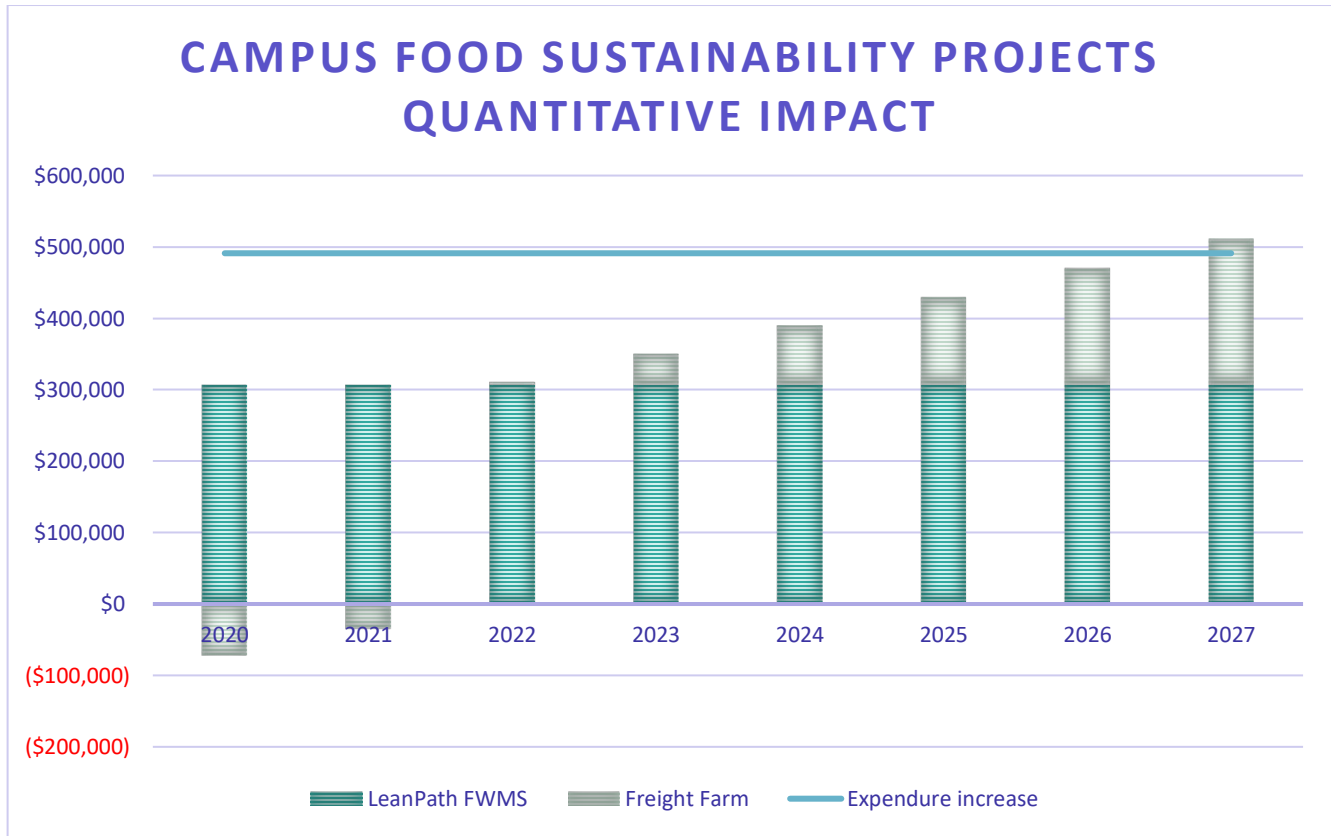


Figure 6: Financial impact of quantifiable campus food sustainability projects shown with expected expenditure increase for sustainable food

Not represented in the above figure are the plant-biased buffet and Saratoga area sustainable food purchasing network. As mentioned in the results, the plant-biased buffet did not have a significant impact on meat consumption. However, our alternative recommendations for reducing meat consumption that do not involve buffet order could introduce a source of savings for the Dining Hall. These cannot yet be quantified (though this would be an excellent area of study for future food intern research, independent studies and/or ESS capstone projects). Similarly, while we can presume that a solidified market for sustainable food in the Saratoga area would make for more competitive pricing of sustainable food, this could not be estimated with any degree of certainty. More competitive (lower) prices for sustainable food would in theory allow for more sustainable food to be purchased and incorporated into the Dining Hall menu, further reducing the additional expenditure necessary to reach 25%. While this number may never be able to be estimated, it is still worthwhile to pursue a



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sustainable food purchasing network in the region with the goal of fostering relationships between producers, distributors, and consumers that allow for a more durable flow of sustainable food products to the region.

Circumstances are apt to change with the rapidly growing sustainable food movement, changing prices, introducing new players, incentives and laws. With this in mind, it should not be expected that the figures presented in this report remain 100% accurate in the future. However, we believe that they do accurately represent the direction and magnitude of efforts required to reach our sustainable food goal. Remaining open to new ideas and possibilities for cooperation will continue to be essential towards achieving our campus sustainability goals. We should not let numbers distract us from what we are trying to achieve: leveraging Skidmore's institutional status and values to enact real and positive change in the food system. Doing so is not a change that can be made overnight, and is meant to challenge our default practices. Our sustainable food goal puts us on the right track towards achieving this, and the projects presented in this portfolio support that effort.

The purpose of engaging in the in-depth feasibility research of this report was to identify projects that are achievable and impactful. We believe that lessons learned from the identified projects can all be implemented within the next six years with dependable outcomes. However, successful implementation will take intentional, strategic, persistent efforts. With the conclusion of this report, we cannot advance the effort any further. We hope that the information presented here will enable our stakeholders to enact the necessary changes with confidence and pride.

### **Acknowledgments**

We would like to extend great gratitude to our stakeholders in both Dining Services and the Sustainability Office for being extremely cooperative and supportive during our research, specifically, Mark Miller, Patrick Girard, Jim Rose, Joe Greco, and Carol Kosiba as well as Levi Rogers and Jennifer Natyzak.

We would also like to thank all of the community members that participated in our research, from phone interviews, to extensive email communication and in person meetings, allowing our efforts to expand beyond the boundaries of Skidmore’s campus and enter into the food system of Saratoga Springs. Notably, we’d like to thank Drew Smith and Adam Costello from 9 Miles East, Margaret Sullivan from the Saratoga Springs School District, Johanna Martin from Saratoga Independent School, Karen Barss and Stephanie Seymour from the Saratoga Hospital, Josh Antonucci from Antonucci Foods, and finally Chris Hartman from Headwater Food Hub.

Lastly, we want to give special mention to our capstone faculty mentors, AJ Schneller and especially Karen Kellogg, who provided guidance for us from day one and engaged in this research with us with inspiring passion, diligence, and professionalism. Thank you.

## Appendices

### *Appendix A: Food category descriptions*

<b>Category</b>	<b>Included</b>	<b>Not Included</b> <i>Key: item (“appropriate category”)</i>
<b>Dairy</b>	fluid milk, cheese, yogurt, ice cream	canned condensed milk products (“grocery”), vegan milk alternatives (“beverages”)
<b>Beverages</b>	soft drinks, sports drinks, milk alternatives	iced tea, iced coffee, bottled coffee & tea drinks (“tea/coffee”)
<b>Meat</b>	beef, lamb, pork, game; including frozen or canned meat products	vegetarian/vegan meat alternatives (“grocery”); poultry (“poultry”)
<b>Poultry</b>	chicken, turkey, other fowl	eggs (“eggs”)
<b>Eggs</b>	shelled eggs, liquid egg product, powdered egg	soy or alternative egg products (“grocery”)
<b>Produce</b>	fresh, cut, or frozen fruits and vegetables	canned, cooked and/or seasoned fruit & vegetable products (“grocery”)
<b>Grocery</b>	grains; staples; most boxed, bottled, jarred, and canned products	bread & baked goods (“baked goods”); other items that fit into other product categories

<b>Tea/Coffee</b>	hot & cold coffee and tea products including bottled beverages, coffee beans	coffee additives like creamer (true dairy products = “dairy”; artificial creamers = “grocery”) or flavoring (“grocery”)
<b>Fish/Seafood</b>	all fish or seafood products, including frozen or canned products	
<b>Baked Goods</b>	baked products (pastries, breads, sweets)	processed/package cookies and crackers (e.g. Oreos) (grocery)

**Appendix B: Full list of recommended items from the targeted purchasing analysis**

<b>Food Product</b>	<b>Estimated Annual Spend (Conv.)</b>	<b>Sust. Alt. % increase</b>	<b>Estimated Annual Spend (Sust.)</b>	<b>Contribution to Sust. Food %</b>
Chicken Breast	\$ 139,926.00	125%	\$ 314,684.57	9.73%
Shrimp	\$ 47,883.00	275%	\$ 179,714.96	5.56%
Salmon (fillet)	\$ 31,302.00	292%	\$ 122,590.35	3.79%
Hard Boiled Eggs	\$ 5,487.00	1211%	\$ 71,909.68	2.22%
Chicken Thigh	\$ 27,990.00	132%	\$ 64,914.80	2.01%
Flour	\$ 13,770.00	225%	\$ 44,752.50	1.38%
Ground Beef	\$ 21,501.00	97%	\$ 42,442.13	1.31%
Marinara Sauce	\$ 10,710.00	275%	\$ 40,181.90	1.24%
Eggs (White and Brown)	\$ 17,991.00	112%	\$ 38,140.92	1.18%
Mozzarella (pizza cheese) blend	\$ 26,928.00	26%	\$ 33,827.46	1.05%
Potato fries (French fries, all shapes)	\$ 31,662.00	158%	\$ 81,579.57	2.52%
Syrup (maple, pancake, and waffle)	\$ 5,754.00	320%	\$ 24,143.05	0.75%
Avocado	\$ 14,274.00	131%	\$ 32,901.98	1.02%
Mango (chunk, frozen)	\$ 5,253.00	470%	\$ 29,930.81	0.93%
Canola Oil	\$ 16,527.00	81%	\$ 29,965.65	0.93%
Bananas	\$ 10,119.00	52%	\$ 15,369.84	0.48%
Chicken Wing	\$ 15,435.00	55%	\$ 23,861.46	0.74%
Feta Cheese	\$ 3,867.00	495%	\$ 23,017.86	0.71%
Ice Cream (all flavors)	\$ 18,387.42	20%	\$ 22,145.68	0.69%
Mushrooms	\$ 14,100.00	129%	\$ 32,237.48	1.00%
Pork Butt	\$ 10,320.00	105%	\$ 21,186.03	0.66%
Pork Loin	\$ 10,419.00	90%	\$ 19,791.11	0.61%

Sausage	\$	21,276.00	58%	\$	33,644.28	1.04%
Alfredo Sauce	\$	32,475.00	12%	\$	36,234.31	1.12%
Almond Milk	\$	5,025.00	249%	\$	17,548.17	0.54%
American Cheese	\$	10,185.00	645%	\$	75,880.25	2.35%
Cheddar Cheese	\$	9,555.00	314%	\$	39,537.93	1.22%
Chocolate Chips	\$	10,476.00	265%	\$	38,202.09	1.18%
Cream Cheese	\$	9,021.00	116%	\$	19,487.52	0.60%
Hamburger Bun	\$	3,897.00	433%	\$	20,768.62	0.64%
Monterey Jack Cheese	\$	9,588.00	181%	\$	26,920.90	0.83%
Soy Milk (Chocolate, vanilla, unflavored)	\$	7,530.00	143%	\$	18,330.51	0.57%
Turkey Breast	\$	51,003.00	350%	\$	229,339.00	7.09%

**Appendix C: Menu and order at Diner station during control and variable replicates of both trials of the Plant-Biased Buffet experiment.**

**Trial 1**

Control:

2/18 Monday 5-8pm (3 hrs)

Left to Right Diner Buffet:

Sliced London Broil Beef / Au Jus / Baked Potato

Potato Salad / Toppings: Bacon / Green Onions / Sour Cream / Shredded Cheddar

Herb Cauliflower / - / Baked Potato

Bok Choy / Broccoli Cheddar Chicken with Ritz Crumb-top / Seasoned Curly Fries

Variable:

3/18 Monday 5-8pm (3 hrs)

Left to Right Diner Buffet:

(closest to plates) Baked potato / Au Jus / London Broil

Sliced pears / Toppings: sour cream / bacon / scallions / cheese ///

Sautéed Broccoli cheddar chicken / R/O roast turkey / herbed cauliflower

Baked potato / chipotle honey butter corn / curly fries (closest to plates)

**Trial 2**

Control:

3/5 Tuesday Dinner (5-8pm)

Left to Right Diner Buffet:

Pernil pork / Spanish rice / bean stew // roasted chipotle corn salad / broccoli coleslaw / mandarin oranges ///

-empty- / broccoli w/ garlic / spicy swiss chard // plantains / carne asada / grilled tortilla

Variable:

4/1 Tuesday Dinner (5-8pm)

Left to Right Dinner Buffet:

Grilled tortillas / plantains / carne asada // pasta salad / apple sauce / pears /// pernil pork / Spanish rice /

broccoli crowns // spicy bok choy / bean stew / fries

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