WASTE MANAGEMENT AUDIT AND SURVEY REPORT

Oyster River Cooperative School District
Published July 2020

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I. ABSTRACT

The Oyster River Cooperative School District is committed to advancing sustainability in its operations, culture, and curriculum. Since the creation of the district environmental sustainability policy, considerable effort has been made in diverting the amount of waste sent to landfills and in engaging students, faculty, and staff in this process.

The standardization of recycling and landfill disposal bins and implementation of cafeteria composting disposal bins were two of the district's largest milestones. While the district has made significant progress, the Sustainability Coordinator recognized the need to do more. Following years of unsuccessful attempts to mitigate the use of plastic water bottles, the Sustainability Coordinator proposed the "Year of Plastic" to educate students on the environmental consequences of plastic use and to engage students in the development of solutions. Echoing the voices of students and faculty from the Oyster River High School, the "Year of Plastic" became the "Year of Waste."

A municipal solid waste audit was conducted within the high school. Additionally, a behavioral and attitudinal survey in regard to waste generation and disposal was administered to middle school and high school students as well as district faculty and staff. The audit and survey revealed that there is considerable contamination between disposal bins likely due to the lack of conveniently located composting bins, unclear bin signage, and lack of encouragement by peers and mentors.

Procedural, structural, and cultural shifts must take place in order to decrease the amount of waste—especially food waste—sent to landfills. It is advisable that the district purchase composting bins for all classrooms and develop clear and consistent signage for all bins. Following these steps, it is advisable that the district develop an educational and engagement program to educate students, faculty, staff, *and* parents about the importance of reducing landfill waste and the protocol for sorting waste items.

Key words: *recycling, composting, landfill, audit, survey, infrastructure, behavior, attitudes, obstacles, opportunities, systems-thinking, educational pedagogy*

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II. INTRODUCTION

The Oyster River Cooperative School District (ORCSD) is a cooperative public school system with four campuses serving the three contiguous communities of Durham, Lee, and Madbury within the State of New Hampshire. The district serves 2,173 students and employs 438 individuals within its two elementary schools (grades K-4), one middle school (grades 5-8), and one high school (grades 9-12). In 2013, taxpayers from the three towns voted to fund sustainability coordinators to assist in the implementation of the district's sustainability policy and procedures. Over the past eight years, the district has made considerable progress in reducing its environmental footprint. However, recognizing the urgency of community-driven climate action, the district committed to including sustainability into its five-year strategic plan released in 2019.

At the forefront of the district's sustainability policy is its commitment to reduce the amount of district waste sent to landfills. The Oyster River Cooperative School District's environmental sustainability policy specifies that the district superintendent or designee should develop and revise as appropriate guidelines, procedures, or strategies to

> Minimize the amount of waste, including food waste, sent to landfills as the district strives to achieve zero waste.
>
> Work with suppliers and service providers who offer products and services to improve the health of district students, staff, and environment. These criteria follow best practices, including products that contain recycled materials which are less toxic, are more biodegradable, have less packaging, cost less to transport, use less energy, and consume fewer natural resources.
>
> Work with contractors, vendors, and suppliers who can state and follow environmental/sustainability practices and offer take-back programs (e.g. shipping materials to ensure waste is disposed of responsibly). The district seeks people who can provide products and services to help it reduce, reuse, and recycle and prefers to work with local contractors, vendors, and suppliers to keep district investments within the local community.

Alongside the district's waste reduction policy is its commitment to improve district awareness of sustainability through curricular and extra-curricular experiences. The Oyster River Cooperative School District's environmental sustainability policy specifies that the district superintendent or designee should develop and revise as appropriate guidelines, procedures, or strategies to

> Heighten awareness about the importance of environmental, economic, and socially responsible practice throughout the district. This accomplished through the curriculum and promotion of programs and initiatives such as school gardens, green teams, etc.
>
> Weave the topics of environmental awareness and sustainable practices through the instructional practices of the district.

Since the hiring of the Sustainability Coordinators, the district has made continual improvements to its waste management system. In 2013 and 2014, the district worked with its waste hauler, Troiano Waste Services, to subcontract with Mr. Fox Composting to institute composting within all the schools. During this time, the Sustainability Coordinators worked on a school-based educational campaign to teach procedures within the cafeteria. In 2015 and 2016, the Facilities Department began standardizing and labeling the waste disposal bins within the classrooms which allowed for stronger educational messaging as students moved through the district schools. In 2017, the Oyster River Middle School hosted a school-wide Trash on the Lawn Day, a program developed by the Northeast Resource Recovery Association. During this event, the Sustainability Coordinators worked with students in grades five through seven to examine, analyze, and discuss the waste generated. Students were put into discussion groups to brainstorm solutions with Alex Fried, the founder of the Post-Landfill Action Network and Oyster River High School graduate.

Most recently, in 2019, the Sustainability Coordinator proposed the idea of conducting an audit to examine and quantify the different waste streams generated within each school. Below is information regarding this project as it developed from October 2019 to May 2020.

III. METHODOLOGY

SURVEY

Behavioral and attitudinal surveys were created to gain additional information unattainable from district waste audits. The overall goals of the survey were to

Understand the barriers and incentives for sorting waste. *Do structural or procedural factors (e.g. disposal bins' locations and signage) or social or attitudinal factors (e.g. personal beliefs, beliefs of others, encouragement from others) positively or negatively impact an individual's decision to sort waste?*

Understand the interplay between students, faculty, staff, and parents. *Do the beliefs and actions of faculty, staff, parents, and friends influence a student's decision to sort waste? Do faculty, staff, parents, and friends encourage a student's decision to sort waste?*

Establish baseline conditions that allow for tracking over time. *Have changes in the district's waste management system increased the convenience and decreased the complexity of waste sorting among students, faculty, and staff? Has the district's sustainability initiatives developed peer and mentor support for waste sorting?*

Utilize the results to tailor waste reduction initiatives in the future. *How can the survey results be used to guide district decision-making in the future to promote sustainability?*

The development of the surveys evolved over a six-month time span. During the preliminary stages of their creation, a literature review was conducted to research pre-existing waste management surveys to better understand what types of questions were appropriate and useful to ask. An additional literature review was conducted to research survey reliability and validity to better understand what considerations were necessary to improve survey robustness and soundness. The following waste management studies provided the guiding principles among which the district survey was based.

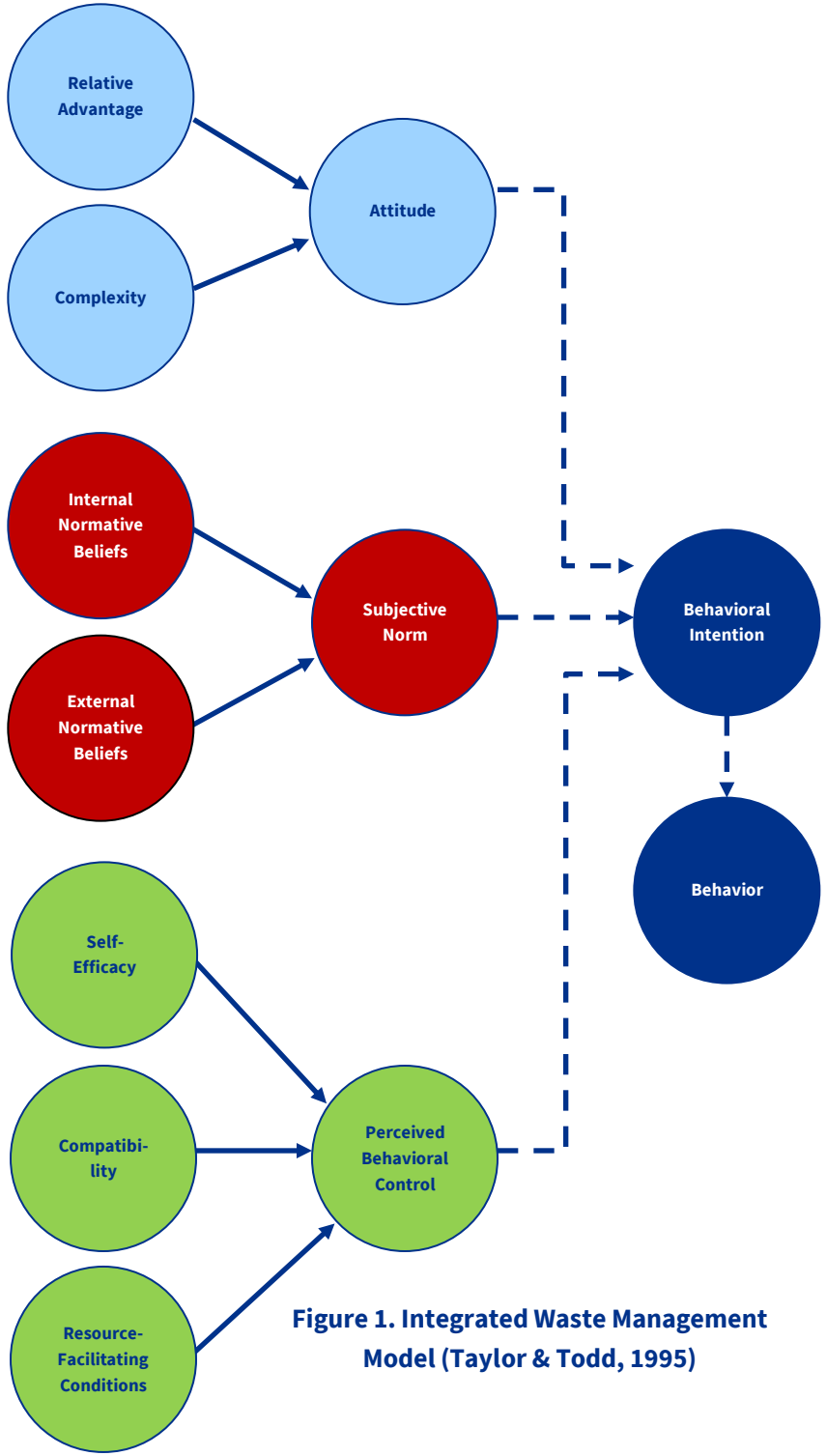


Figure 1. Integrated Waste Management Model (Taylor & Todd, 1995)

In 1995, Shirley Taylor and Peter Todd, Associate Professors at Queen's University, developed an integrated waste management model that utilizes the theory of planned behavior to explain individuals' intentions to recycle and compost (see figure 1). The model was tested utilizing recycling and composting data from a sample of 700+ individuals. Taylor and Todd concluded that the model offers both insight into the factors influencing an individual's decision to sort waste and guidance for waste management policy-makers. Taken nearly verbatim from their study, behavioral intention is a product of the following factors

Attitude – reflects feelings of favorableness or unfavorableness toward a behavior

> **Relative advantage** – refers to the degree to which an innovation provides benefits that supersede those of its precursor and may include economic benefits, image enhancement, convenience, and satisfaction (e.g. costs and benefits)
>
> **Complexity** – refers to the degree to which an innovation is perceived to be difficult to understand or use (characteristic of the behavior) ◎

Subjective norm – reflects perceptions that others desire the individual to perform or not to perform a behavior

> **Internal social influences** – refers to family ◎
>
> **External social influences** – refers to friends, neighbors, classmates, teammates, teachers, celebrities, etc. ◎

Perceived behavioral control – reflects beliefs regarding control over factors that may facilitate or impede performance of a behavior

> **Self-efficacy** – refers to the perceived ability to carry out the behavior (characteristic of the individual)
>
> **Perceived compatibility** – refers to the degree to which the innovation fits with the potential adopter's existing values, lifestyles, previous experiences, and current needs (e.g. effort, convenience, values) ◎
>
> **Resource facilitating conditions** – refers to access to resources necessary to perform the behavior (e.g. barriers) ◎

In 2013, Erin Redman, Assistant Professor at the University of Wisconsin, developed a sustainability education logic model that provides students with experiential, real-world, and problem-based learning experiences (see figure 2). The model was practiced on three middle school students and three high school students through an intensive two-week program exploring the individuals' local food system. While the sample size was too small to determine whether this education pedagogy transcended conventional education pedagogy in terms of lasting sustainability thought and action, it provides insight into the factors influencing an individual's decision to change behavior and guidance for non-traditional, experiential education programs. Taken nearly verbatim from her study, behavioral intention is a product of the following types of knowledge

Declarative knowledge – consists of information about how ecosystems function and how people interact with and impact the environment through their actions and decisions

Procedural knowledge – consists of "how to" information that builds an individual's capacity for action and correlates closely with situational and structural factors that may facilitate or constrain individual action ✪

Effectiveness knowledge – describes the individual's perceptions of whether a certain behavior is worthwhile and desirable ✪

Social knowledge – consists of information about the motives and intentions of other people as well as the perceptions about expectations in terms of perceived desirability of particular actions or decisions ✪

These studies were utilized throughout the development of both the waste surveys and audits to ascertain that valuable objective and subjective data were collected and that students were provided hands-on educational opportunities.

◎ *principles utilized throughout some or all of the surveys*
✪ *types of knowledge utilized throughout some or all of the surveys*

Three versions of the same survey were created and administered to middle school students, high school students, and district faculty and staff throughout the month of April. Each survey was 12 to 13 questions, including multiple choice, grid matrix, slider scale, and free response questions (see appendix).

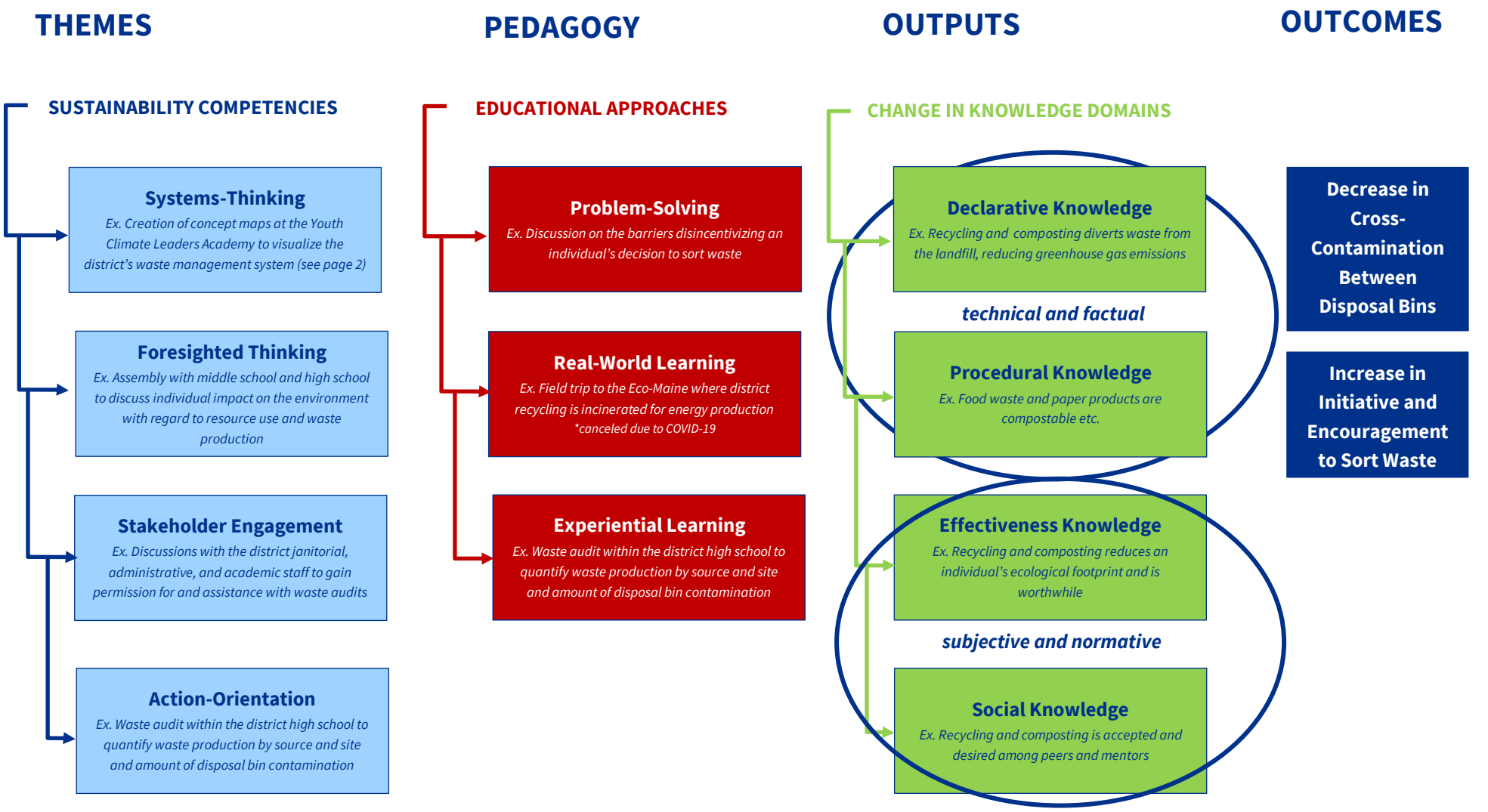


Figure 2. Sustainability Education Logic Model adapted from (Redman, 2013)

WASTE AUDIT

A municipal solid waste audit was conducted to better understand the district's waste management system. The overall goals of the audit were to

Identify the major sources of waste. *Where is the waste coming from (e.g. classrooms, administration, home, downtown, cafeteria, etc.)?*

Identify the major categories of waste. *What types of waste are being produced most (e.g. organics, paper products, recyclable plastics, single-use plastics, cardboard, metals, glass)?*

Understand the degree of contamination between disposal bins. *Are students, faculty, and staff properly sorting their waste?*

Establish baseline conditions that allow for tracking over time. *Have changes in the district's waste management system decreased the contamination between disposal bins or decreased the amount of waste—particularly landfill waste—disposed of?*

Utilize the results to tailor waste reduction initiatives in the future. *How can the audit results be used to guide district decision-making in the future to promote sustainability?*

The development of the audit evolved over a five-month time span. During the preliminary stages of its creation, a literature review was conducted to research pre-existing waste audits to better understand what procedures to follow. Beyond this preliminary stage, the development and launch of the audit was undertaken by a group of eight high school students and two high school teachers (see appendix). The intention was to conduct three waste audits within each district school throughout the third and fourth quarter to gain a more comprehensive understanding of the production of waste across all schools. Due to time, resource, and situational constraints, only one waste audit was conducted in February at the high school. The high school was divided into "zones" (e.g. classrooms, offices, etc.). Within each zone, a significant number of rooms or bins (~20%) were randomly selected for sampling. Each sample was dissected and sorted according to category and weighed for mass. For each sample, landfill (black bags) and recycling (white bags) bags were sorted, weighed, and recorded independently.

IV. RESULTS

SURVEY

Responses were collected from a total of 426 individuals, including 131 high school students, 182 middle school students, and 113 district faculty and staff.

Of the high school student respondents, 18.3% were freshmen, 35.9% were sophomores, 38.2% were juniors, and 7.6% were seniors. Moreover, 57.3% of respondents had been in the school district since elementary school, 16.8% since middle school, and 26.0% since high school. Collectively, 70.2% of respondents ate lunch within the cafeteria, 6.1% within the core (central locker room), 3.8% within classrooms, 0.8% within downtown eateries, and 19.1% within other unspecified locations. Additionally, 61.8% of respondents sourced their lunch from home, 36.6% from the cafeteria, and 1.5% from downtown.

Of the middle school student respondents, 37.9% were fifth-graders, 0.0% were sixth-graders, 33.0% were seventh-graders, and 29.1% were eighth-graders. Moreover, 79.1% of respondents had been in the school district since elementary school and 20.9% since middle school. Collectively, 89.6% of respondents ate lunch within the cafeteria, 3.8% within classrooms, and 6.6% within other unspecified locations. Additionally, 61.0% of respondents sourced their lunch from home and 39.0% from the cafeteria.

Of the district faculty and staff (across all four schools), 8.1% were administrative staff, 85.8% were academic faculty 0.9% were janitorial staff, 0.0% were cafeteria staff, and 5.3% were other unspecified staff. Moreover, 12.4% of respondents had been employed by the district for less than one year, 14.2% for one to three years, 9.7% for three to five years, and 63.7% for over five years. Collectively, 1.8% of respondents ate lunch within the cafeteria, 62.8% within classrooms, 18.6 within the faculty lounge, 6.2% within administrative offices, 0.0% within downtown eateries, and 10.6% within other unspecified locations. Additionally, 96.5% of respondents sourced their lunch from home, 3.5% from the cafeteria, and 0.0% from downtown.

In response to the statement "it can be confusing to figure out whether an item can or cannot be recycled/composted," all respondent audiences reported that recycling was more confusing than composting. The highest percentages of high school student, middle school student, and district faculty and staff respondents "tentatively disagreed" (32.8%, 37.9%, 29.2% respectively) and "neither agreed or disagreed" (22.9%, 30.2%, and 29.2% respectively) with the statement for recycling (see figure 3). Conversely, the highest percentages of high school student, middle school student, and district faculty and staff respondents "strongly disagreed" (34.4%, 39.0%, 26.5% respectively) and "tentatively disagreed" (34.5%, 32.4%, and 26.5% respectively) with the statement for composting (see figure 4).

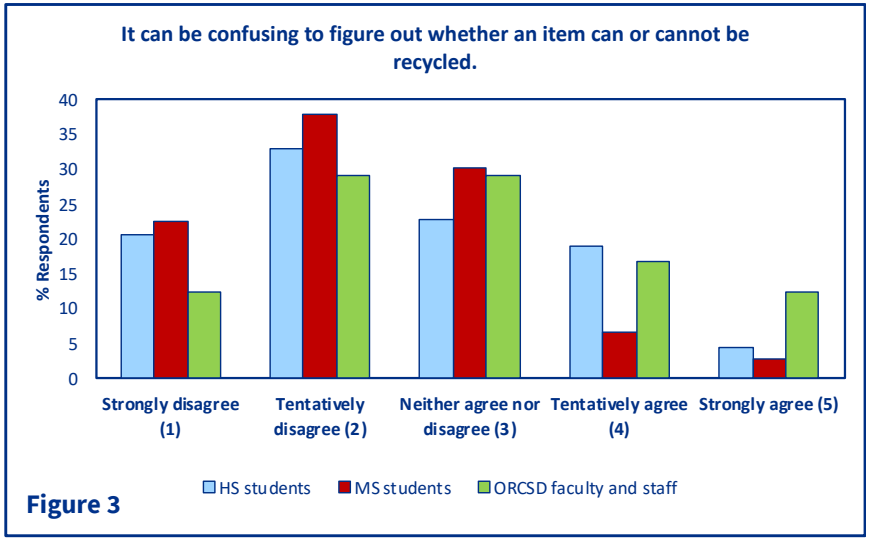


Figure 3

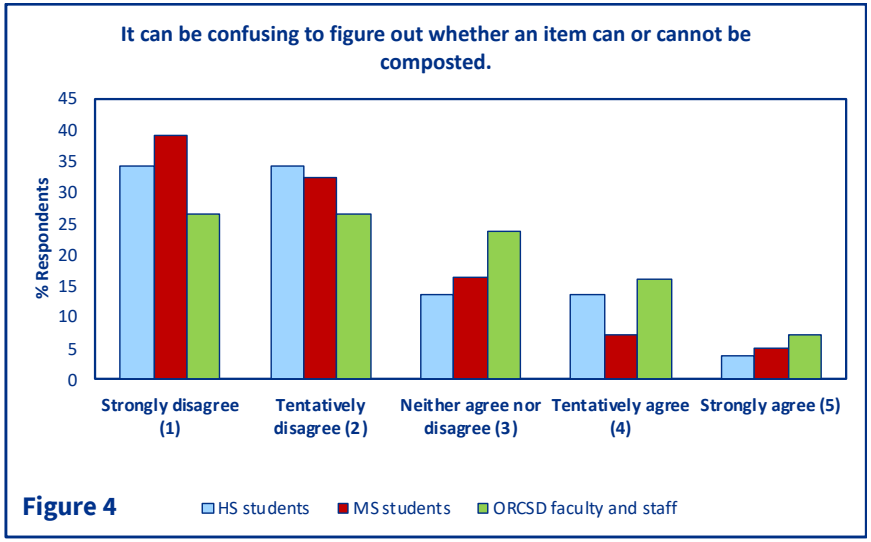
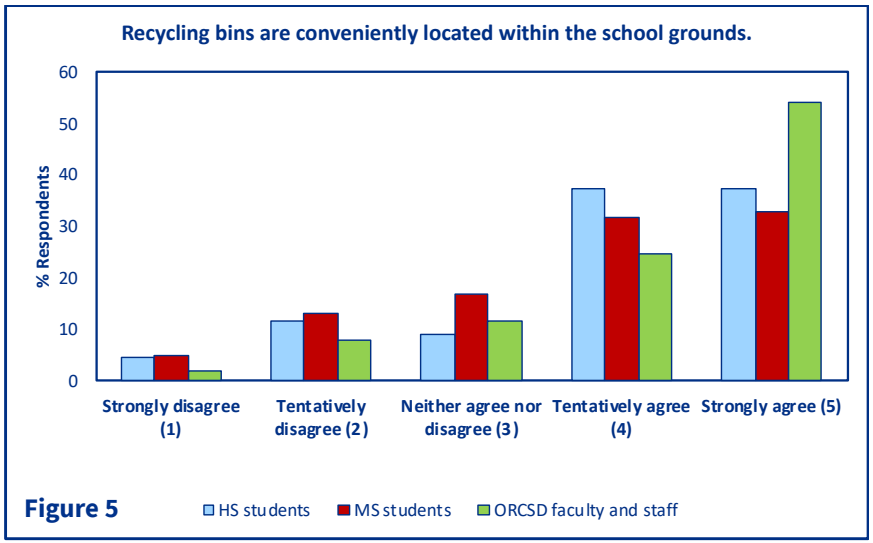


Figure 4

In response to the statement “recycling bins are conveniently located within the school grounds,” all respondent audiences reported that the recycling bins were more conveniently located than the composting bins. The highest percentage of high school student, middle school student, and district faculty and staff respondents “strongly agreed” (37.4%, 33.0%, 54.0% respectively) and “tentatively agreed” (37.4%, 31.9%, and 24.8% respectively) with the statement for recycling (see figure 5). Conversely, high school student, middle school school student, and district faculty and staff respondents more evenly responded across answers for the statement for composting, with only slightly more respondents “tentatively disagreeing” (27.5%, 26.9%, 31.0% respectively) (see figure 6).



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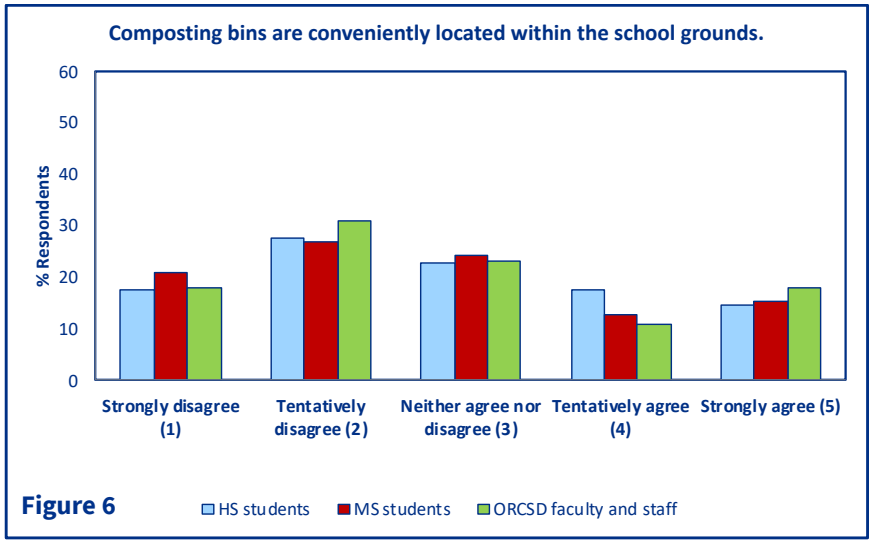


Figure 6

In response to the statement “there is clear signage that distinguishes what can or cannot be recycled or composted,” the majority of respondent audiences answered neutrally or positively. The highest percentage of high school student, middle school student, and district faculty and staff respondents “tentatively agreed” (28.2%, 28.6%, 31.0% respectively) with the statement. A similarly high percentage of high school student, middle school student, and district faculty and staff respondents “neither agreed nor disagreed” (25.2%, 25.3%, 27.4% respectively) with the statement. Interestingly, a high percentage of middle school student respondents (29.1%), moderate percentage of high school student respondents (23.7%), and low percentage of district faculty and staff respondents (15.0%) “strongly agreed” with the statement (see figure 7).

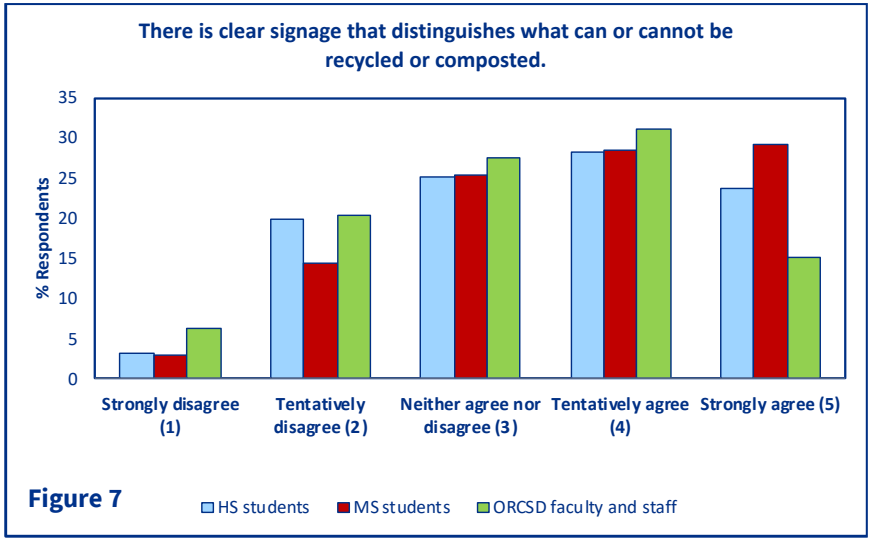


Figure 7

In response to the question “when recycling, composting, or disposing of trash, what is important to you”, the high school student and middle school student respondent audiences reported that convenient location of disposal bins followed by clear signage of disposal bins were “more important” (convenient location HS = 41.2%, convenient location MS = 39.6%, clear signage HS = 49.6%, clear signage MS

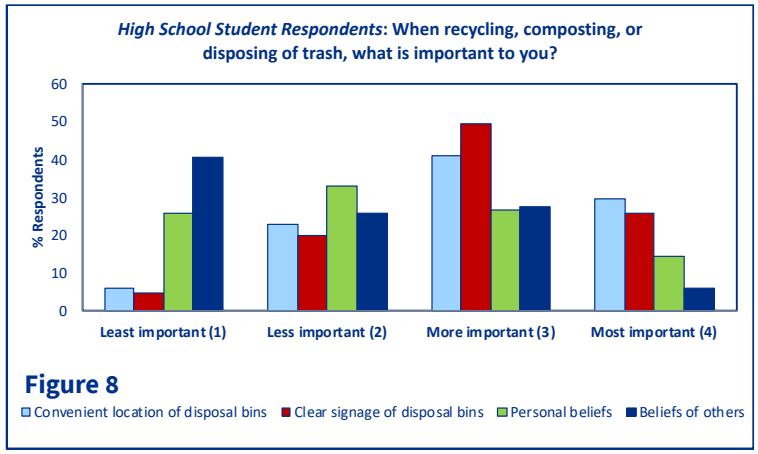
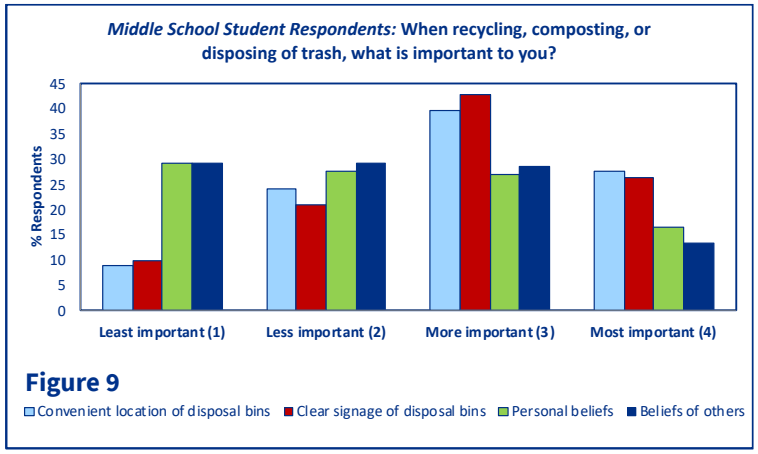


Figure 8



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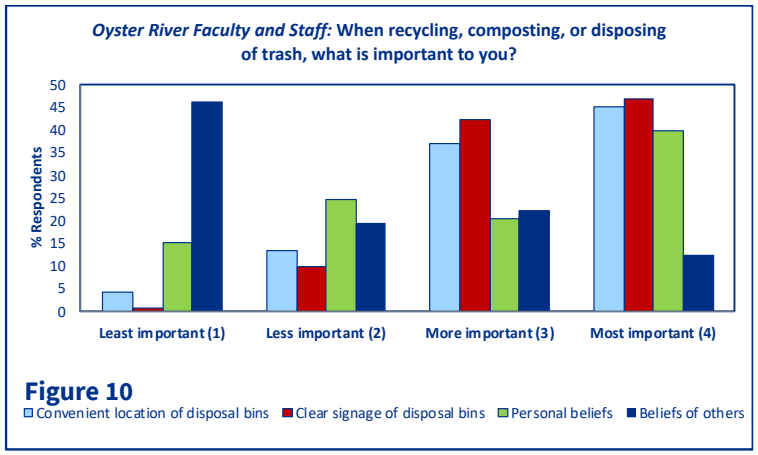
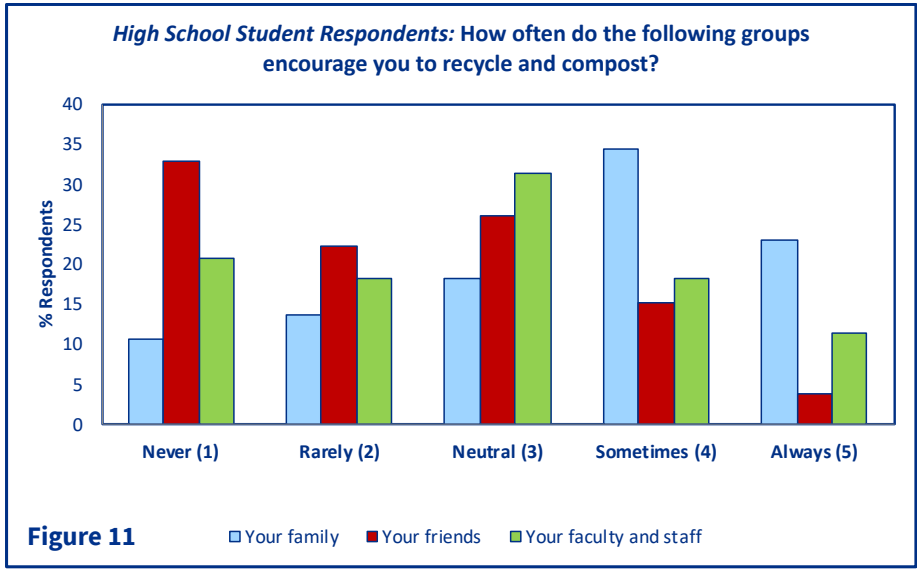


Figure 10

= 42.9%) and "most important" (convenient location HS = 29.8%, convenient location MS = 27.5%, clear signage HS = 26.0%, clear signage MS = 26.4%) (see figure 8 and 9). The district faculty and staff audience reported that clear signage of disposal bins followed by convenient location of disposal bins were "more important" (42.5%, 37.2% respectively) and that clear signage of disposal bins followed by convenient location of disposal bins and personal beliefs were "most important" (46.9%, 45.1%, 39.8% respectively) (see figure 10). These data were consistent with previous data showing that high school student and middle school student respondents more strongly agreed than district faculty and staff did that there was clear signage distinguishing what can or cannot be recycled or composted.

Finally, in response to the question "how often do the following groups encourage you to recycle and compost," both high school student and middle school student respondent audiences reported that their family more often encourage them to recycle and compost than do their friends. Approximately 34.4% and 22.9% of high school student respondents reported that their families "sometimes" and "always" encourage them to recycle and compost, but only 15.3% and 3.8% of their friends encourage them to recycle and compost (see figure 11). Approximately, 28.0% and 30.2% of middle school student respondents reported that their families "sometimes" and "always" encourage them to recycle and compost, but only 8.2% and 9.3% of their friends encourage them to recycle and compost (see figure 12). Interestingly, a higher percentage of middle school student respondents reported that their faculty and staff "sometimes" and "always" (25.3% and 21.4% respectively) encourage them to recycle and compost than high school student respondents reported (18.3% and 11.5% respectively).



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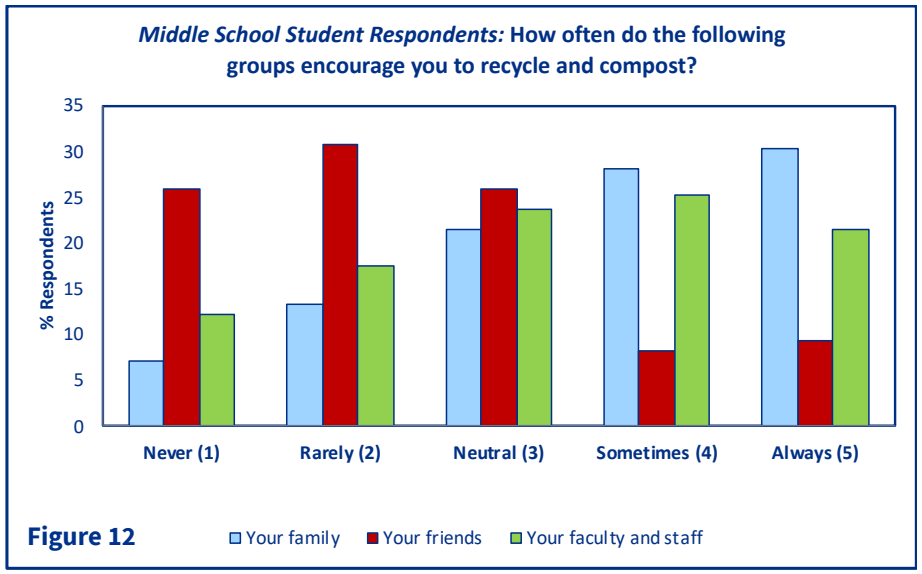


Figure 12

WASTE AUDIT

The waste audit was conducted over two-days at the high school. Audit data values were multiplied out to provide a rough estimate the yearly generation of different types of waste (e.g. organics, office paper, paper products, glass, aluminum foil, aluminum cans, other metals, plastics # 1-7, and plastics with no #) and contamination between disposal bins. Organics, paper, and plastic were produced in the greatest abundance. Organics were disposed of most frequently within the classrooms followed by the cafeteria (4,988.7 lbs and 4,200.8 respectively). Office paper and paper products were disposed of most frequently within the classrooms (6,393.9 lbs and 4,145.5 lbs) followed by the offices (1,780.0 and 356.0 lbs respectively). Plastics # 1-7 and plastics with no # were disposed of most frequently within the classrooms (3,372.6 lbs and 3,442.9 lbs respectively) (see figures 13, 14, 15, and 16).

Interestingly, the amount of organics entering landfill and recycling bins within the classrooms, common areas, offices, and cafeteria each year (7,322.4 lb) far exceeded the amount of organics entering composting bins within the cafeteria each year (2,527.6 lb) (see figure 17). Additionally, a substantial amount of plastics # 1-7 which can typically be recycled (dependent upon recycling protocol) were disposed of in landfill bins rather than recycling bins (1,690.7 lb). Similarly, a substantial amount of plastics with no # which cannot be recycled were disposed of in recycling bins rather than landfill bins (1,861.8 lb) (see figure 18). These data indicate that there is a high level of contamination between bins.

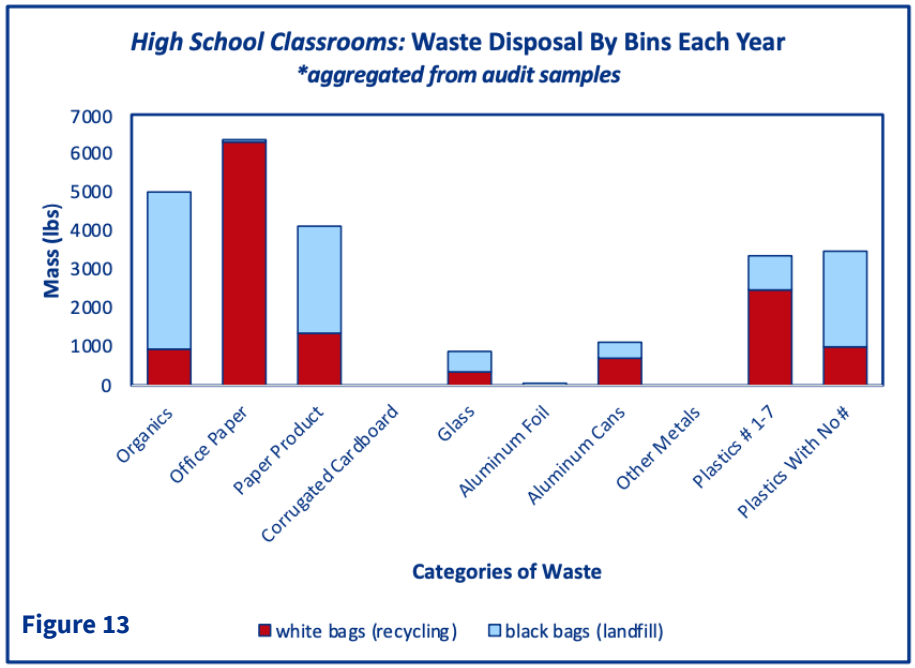
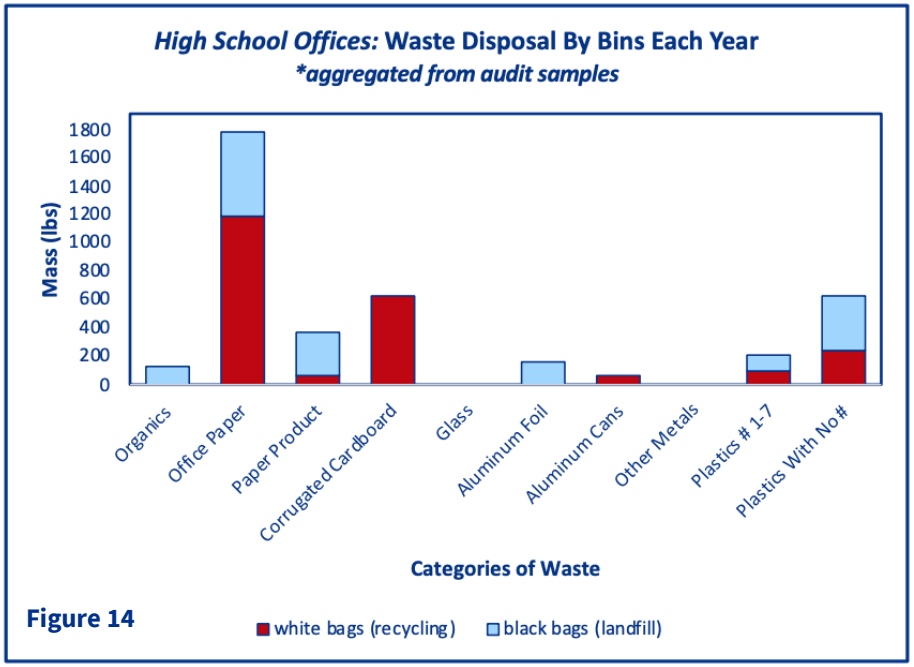


Figure 13



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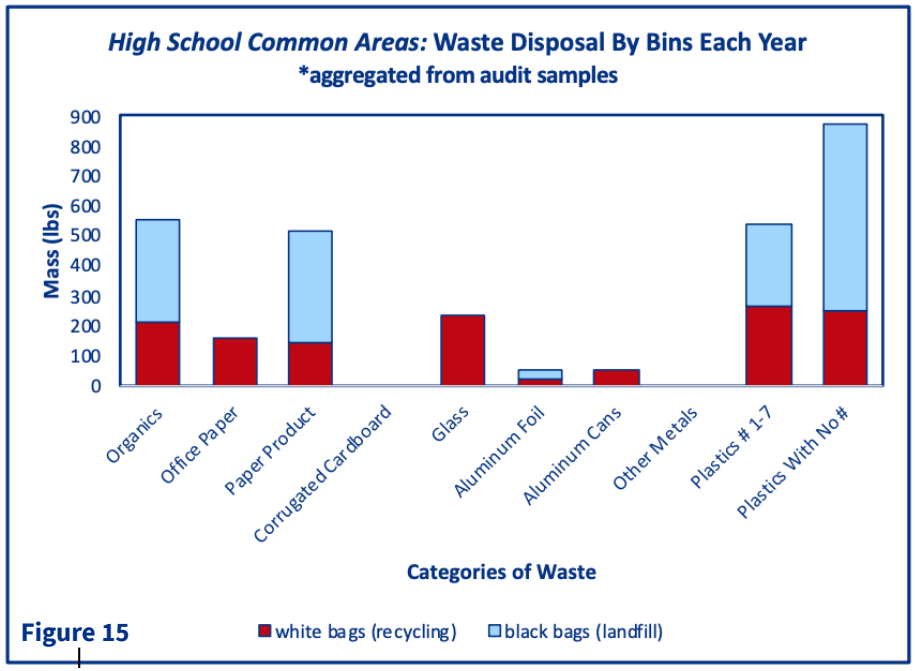

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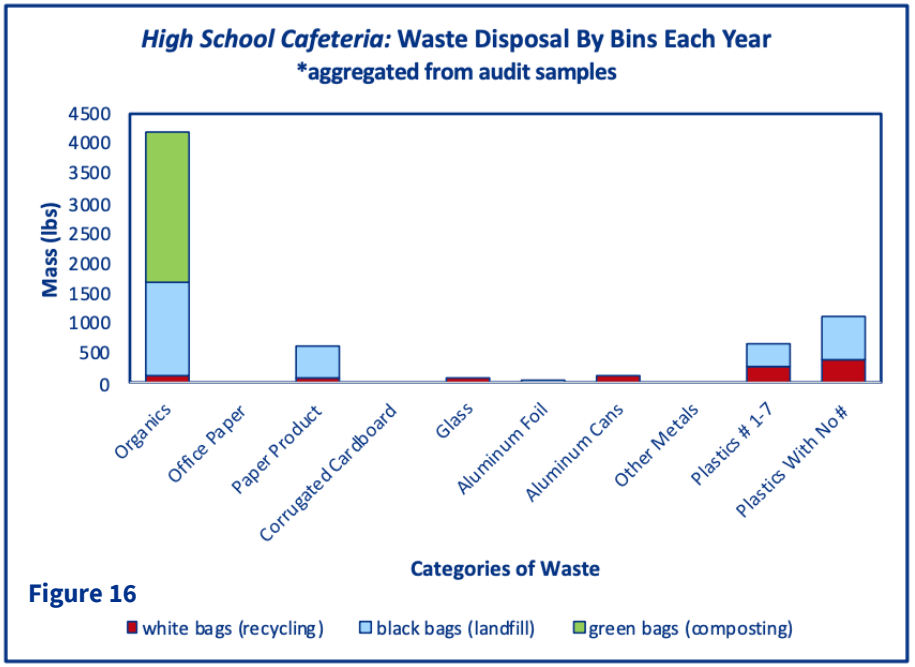

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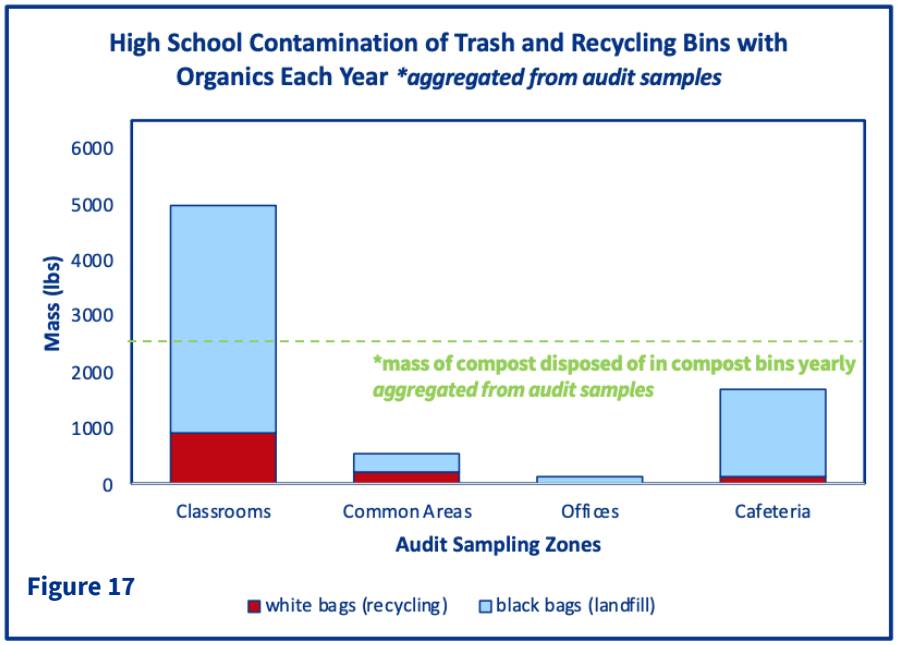


Figure 17

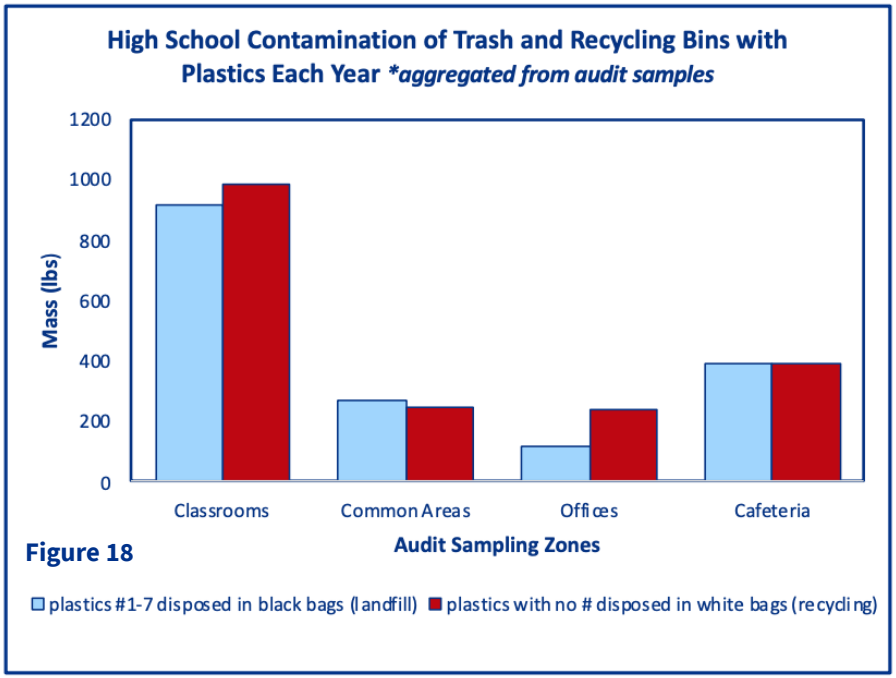


Figure 18

V. DISCUSSION

LIMITATIONS

While situational and logistical constraints prohibited the waste audit and survey to take the form originally intended, they yielded important information nonetheless that will help district decision-makers to advance sustainability.

The original intent was to administer the behavioral and attitudinal waste management surveys during advisor proctored periods to 1) increase response rate and 2) compare grade to grade responses. Due to COVID-19, classes were conducted virtually during the dissemination of the surveys, resulting in varied response rates by grade. For these reasons, each grade was unequally represented in survey results, prohibiting a comparative analysis between grades.

Moreover, the original intent was to conduct three waste audits within each school throughout third and fourth quarters to 1) account for variability in the temporal production and disposal of waste and 2) increase the validity and reliability of the results. Due to logistical constraints and COVID-19, only one waste audit was conducted within the high school. While this compromises the data's validity and reliability, the audit results still yield important and powerful information. Additional audits should be conducted within the middle school and elementary schools to analyze the efficacy of their waste management systems, especially in regard to contamination rates.

CONCLUSIONS

Based upon the data, convenience (both location and understandability) is the largest factor in students, faculty, and staff's decision to sort their waste. Second to these factors is the district culture (personal beliefs, beliefs of others, and encouragement by others).

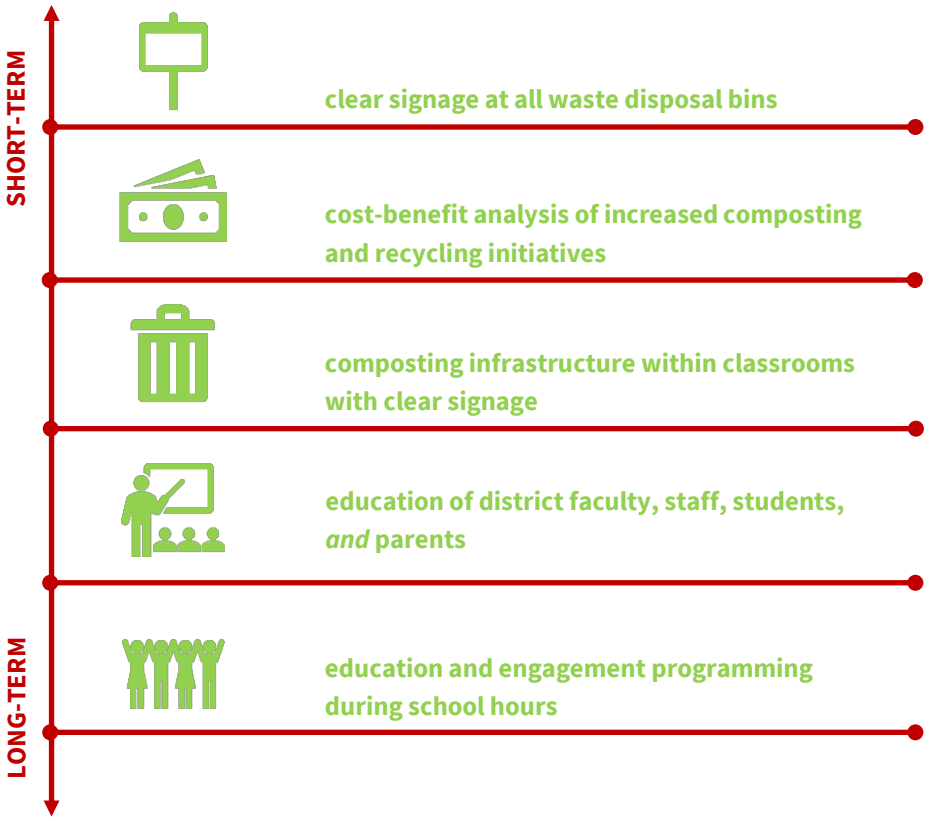
The largest flaw within the high school's waste management system is its composting infrastructure. Approximately 7,322.4 lb of organic waste is improperly disposed of in recycling and landfill bins each year. Additionally, approximately 5,658.5 lb of paper products that are likely compostable are disposed of in recycling and landfill bins. Within these previous figures, about 4,145.5 lb of organics and 4,988.7 lb of paper products are disposed of in recycling and landfill bins within

classrooms each year. Much of the organic waste is produced by faculty and staff as 62.8% of district faculty and staff respondents and only 3.8% of high school student respondents reported eating lunch most frequently in classrooms. According to district survey results, failure to compost waste is likely attributable to the lack of convenient location of disposal bins rather than the understandability of composting procedure. Through the placement of composting disposal bins with clear signage in classrooms, more organics and paper products can be diverted from landfill disposal bins.

Within the high school, a substantial amount of plastics # 1-7 which can typically be recycled (dependent upon recycling protocol) are disposed of in landfill bins rather than recycling bins (1,690.7 lb) each year. Similarly, a substantial amount of plastics with no # which cannot be recycled are disposed of in recycling bins rather than landfill bins (1,861.8 lb) each year. These data indicate that there is a high level of contamination between bins. The education of district faculty, staff, students, *and* parents is a powerful step in reducing the production of plastics—especially single-use plastics—and increasing the proper disposal of these products within all district schools. Given the transient nature of recycling policy, clear education and signage is of utmost importance. Much of the plastic waste is generated from home-packed lunches as 61.8% of high school student respondents, 61.0% of middle school student respondents, and 96.5% of district faculty and staff respondents reported sourcing their lunches primarily from home. In other words, what happens at home has a large impact on what happens in school.

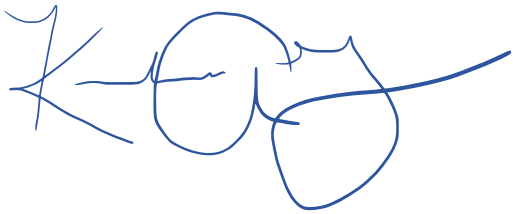
Beyond these procedural and structural changes, yearly education and engagement programming surrounding responsible production and disposal of waste is a useful tool in developing a "culture of sustainability." Social pressures—especially among high school students—have a large influence on a student's behavior. Only 15.3% and 3.8% of high school student respondents felt that their friends "sometimes" and "always" encourage them to recycle and compost. And only 18.3% and 11.5% of high school student respondents felt that their faculty and staff "sometimes" and "always" encourage them to recycle and compost. Only 8.2% and 9.3% of middle school student respondents reported that their friends "sometimes" and "always" encourage them to recycle and compost. Encouragement to recycle and compost from both peers and mentors is necessary for high school and middle school students to feel that their decision to sort waste is both accepted and supported. Education and engagement programming can take many forms, including upcycled art murals, documentaries, speakers, beach clean-ups, bulletin board and bathroom stall signage, etc.

Through these initiatives, the high school and likely elementary and middle schools can yield much higher landfill diversion rates. Additional research should be conducted on the economic implications of increased recycling and composting procedures. Various studies show that landfill diversion results in favorable economic benefits. In 2011, Middlebury College of Vermont expanded organic food collection to residence halls and offices (BioCycle, 2012). In a single year, it avoided $101,475 in landfill fees by recycling 441.8 tons and composting 370.0 tons. Each year, the Tahoe Truckee Unified School District of California saves $50,000 from recycling and waste reduction efforts (CalRecycle, 2019).



VI. ACKNOWLEDGEMENTS

This research would not have been possible without the collective effort of many individuals within the broader Durham community. I would like to thank Maggie Morrison, Sustainability Coordinator of the Oyster River Cooperative School District, for providing me with endless opportunities to develop professionally and to explore sustainability from all district perspectives. I would like to thank Todd Allen, Assistant Superintend of Schools for the Oyster River Cooperative School District, for reviewing the surveys, connecting me with the Oyster River Middle School and Oyster River High School Principals, and organizing teacher sustainability meetings. I would like to thank Jonathan Bromley, Environmental Science Teacher of the Oyster River High School, for developing the high school waste audit, organizing the Oyster River High School Sustainability Club, and piloting the high school student survey. I would like to thank Dr. Cliff Brown, Associate Professor, of the University of New Hampshire's Department of Sociology as well as Dr. Andrew Smith, Director, and Sean McKinley, Research Assistant, of the University of New Hampshire's Survey Center for providing me with valuable feedback on the creation of surveys and reviewing preliminary survey drafts. Finally, I would like to thank the Vermont Energy Education Program and the New Hampshire Energy Education Project for hosting the Youth Climate Leaders Academy where individuals from the Oyster River High School kick started planning of the waste audits and survey.



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VIII. APPENDIX

SURVEY QUESTIONS AND RAW DATA

Demographics

- What grade are you in? (*freshman/sophomore/junior/senior*) ◎
- What grade are you in? (*fifth/sixth/seventh/eighth*) ★
- Which of the following best describes the department in which you currently work? (*administrative/academic/janitorial/cafeteria/other)* ◐
- How long have you been a student in the Oyster River Cooperative School District? (*since elementary school/since middle school/since high school*) ◎
- How long have you been a student in the Oyster River Cooperative School District? (*since elementary school/since middle school*) ★
- How long have you worked in your current role in the Oyster River Cooperative School District? (*less than one year/one to three years/three to five years/more than five years)* ◐

Behavioral Intentions

- Where do you most frequently eat lunch? (*cafeteria/classroom//core/downtown/home/other*) ◎
- Where do you most frequently eat lunch? (*cafeteria/classroom/office/multipurpose room/other)* ★
- Where do you most frequently eat lunch? (*cafeteria/classroom/faculty lounge/administrative office/downtown/other)* ◐
- Where do you most often get your lunch? (*purchased meal from the cafeteria/packed lunch or meal at home/purchased meal from downtown*)
- Where do you most often get your lunch? (*purchase meal from the cafeteria/packed lunch*) ★

Complexity

Please indicate whether you agree or disagree with the following statements for your actions while at school.

- It can be confusing to figure out whether an item can or cannot be recycled. (*strongly disagree/strongly agree*)
- It can be confusing to figure out whether an item can or cannot be composted. (*strongly disagree/strongly agree*)

Resource-Facilitating Conditions

Please indicate whether you agree or disagree with the following statements for your actions while at school.

- Recycling bins are conveniently located within the school grounds. (*disagree/agree*)
- Composting bins are conveniently located within the school grounds. (*disagree/agree*)
- There is clear signage that distinguishes what can or cannot be recycled or composted . (*disagree/agree*)
- When recycling, composting, and disposing of trash, what is most important to you? Rank by importance. (*convenient location of disposal bins/clear signage of disposal bins/personal beliefs/beliefs of others (family, friends, teachers, classmates)*)

Attitudes

- How important is recycling and composting to you personally? (*not at all important/not very important/somewhat important/very important*)

Normative Beliefs

- How often do the following groups encourage you to recycle and compost? ◎★
    - Your family (*never/rarely/sometimes/always*)
    - Your friends (*never/rarely/sometimes/always*)
    - Your school's faculty and staff (*never/rarely/sometimes/always*)

Knowledge

- How familiar are you with the Oyster River Cooperative School District's goal to minimize the amount of waste, including food, sent to landfills? (*very familiar/somewhat familiar/not very familiar/not at all familiar*) ⌽

Free Response

- Are there any other barriers to recycling or composting while at school? If so, please elaborate.

◎ *only applicable to the high school student survey*
★ *only applicable to the middle school student survey*
⌽ *only applicable to the oyster river district faculty and staff survey*

WASTE MANAGEMENT ATTITUDINAL AND BEHAVIORAL SURVEY						
# Oyster River High School (HS) student respondents: 131						
# Oyster River Middle School (MS) student respondents: 182						
# Oyster River Cooperative School District (OR) faculty and staff respondents: 113						
SURVEY QUESTION	**HS (#)**	**HS (5)**	**MS (3)**	**MS (%)**	**OR (#)**	**OR (%)**
What grade/department are you in?						
Freshman/Fifth/Administrative	24	18.32	69	37.91	9	8.11
Sophomore/Sixth/Academic	47	35.88	0	0	97	85.84
Junior/Seventh/Janitorial	50	38.17	60	32.97	1	0.88
Senior/Eight/Cafeteria	10	7.63	53	29.12	0	0
Other	N/A	N/A	N/A	N/A	6	5.31
How long have you been a student/faculty/staff at the Oyster River Cooperative School District?						
Since elementary school/Less than one year	75	57.25	144	79.12	14	12.39
Since middle school/One to three years	22	16.79	38	20.88	16	14.16
Since high school/Three to five years	34	25.95	N/A	N/A	11	9.73
More than five years	N/A	N/A	N/A	N/A	72	63.72
Where do you most frequently eat lunch?						
Cafeteria	92	70.23	163	89.56	2	1.77
Core	8	6.11	N/A	0	N/A	0
Classroom	5	3.82	7	3.85	71	62.83
Faculty lounge	N/A	0	N/A	0	21	18.58
Administrative office	N/A	0	N/A	0	7	6.19

Downtown	1	0.76	N/A	0	0	0
Other	25	19.08	12	6.59	12	10.62
Where do you most often get your lunch?						
Packed lunch/meal at home	81	61.83	111	60.99	109	96.46
Purchased meal from the cafeteria	48	36.64	71	39.01	4	3.54
Purchase meal from downtown	2	1.53	N/A	N/A	0	0
It can be confusing to figure out whether an item can or cannot be recycled?						
Strongly disagree (1)	27	20.61	41	22.53	14	12.39
Tentatively disagree (2)	43	32.82	69	37.91	33	29.20
Neither agree nor disagree (3)	30	22.90	55	30.22	33	29.20
Tentatively agree (4)	25	19.08	12	6.59	19	16.81
Strongly agree (5)	6	4.58	5	2.75	14	12.39
It can be confusing to figure out whether an item can or cannot be composted?						
Strongly disagree (1)	45	34.35	71	39.01	30	26.55
Tentatively disagree (2)	45	34.35	59	32.42	30	26.55
Neither agree nor disagree (3)	18	13.74	30	16.48	27	23.89
Tentatively agree (4)	18	13.74	13	7.14	18	15.93
Strongly agree (5)	5	3.82	9	4.95	8	7.08
Recycling bins are conveniently located within the school grounds.						
Strongly disagree (1)	6	4.58	9	4.95	2	1.77
Tentatively disagree (2)	15	11.45	24	13.19	9	7.96
Neither agree nor disagree (3)	12	9.16	31	17.03	13	11.50

Tentatively agree (4)	49	37.40	58	31.87	28	24.78
Strongly agree (5)	49	37.40	60	21.97	61	53.98
Composting bins are conveniently located within the school grounds.						
Strongly disagree (1)	23	17.56	38	20.88	20	17.70
Tentatively disagree (2)	36	27.48	49	26.92	35	30.97
Neither agree nor disagree (3)	30	22.90	44	24.18	26	23.01
Tentatively agree (4)	23	17.56	23	12.64	12	10.62
Strongly agree (5)	19	14.50	28	15.38	20	17.70
There is clear signage that distinguishes what can or cannot be recycled or composted.						
Strongly disagree (1)	4	3.05	5	2.75	7	6.19
Tentatively disagree (2)	26	19.85	26	14.29	23	20.35
Neither agree nor disagree (3)	33	25.19	46	25.27	31	27.43
Tentatively agree (4)	37	28.24	52	28.57	35	30.97
Strongly agree (5)	31	23.66	53	29.12	17	15.04
When recycling, composting, or disposing of trash, what is important to you?						
Convenient location of disposal bins						
Least important (1)	8	6.11	16	8.79	5	4.42
Less important (2)	30	22.90	44	24.18	15	13.27
More important (3)	54	41.22	72	39.56	42	37.17
Most important (4)	39	29.77	50	27.47	51	45.13
Clear signage of disposal bins						
Least important (1)	6	4.58	18	9.89	1	0.88

Less important (2)	26	19.85	38	20.88	11	9.73
More important (3)	65	49.62	78	42.86	48	42.48
Most important (4)	34	25.95	48	26.37	53	46.90
Personal beliefs						
Least important (1)	34	25.95	53	29.12	17	15.044
Less important (2)	43	32.82	50	27.47	28	24.78
More important (3)	35	26.72	49	26.92	23	20.35
Most important (4)	19	14.50	30	16.48	45	39.82
Beliefs of others (family, friends, teachers, classmates)						
Least important (1)	53	40.46	53	29.12	52	46.02
Less important (2)	34	25.95	53	29.12	22	19.47
More important (3)	36	27.48	52	28.57	25	22.12
Most important (4)	8	6.11	24	13.19	14	12.39
How important is recycling and composting to you personally?						
Not at all important (1)	5	3.82	4	2.20	0	0
Not very important (2)	19	14.50	26	14.29	3	2.65
Important (3)	64	48.85	69	37.91	26	23.01
Very important (4)	43	32.82	83	45.60	84	74.34
How often do the following groups encourage you to recycle and compost? ***Your family***						
Never (1)	14	10.69	13	7.14	N/A	N/A
Rarely (2)	18	13.74	24	13.19	N/A	N/A

Neutral (3)	24	18.32	39	21.43	N/A	N/A
Sometimes (4)	45	34.35	51	28.02	N/A	N/A
Always (5)	30	22.90	55	30.22	N/A	N/A
Your friends						
Never (1)	43	32.82	47	25.82	N/A	N/A
Rarely (2)	29	22.14	56	30.77	N/A	N/A
Neutral (3)	34	25.95	47	25.82	N/A	N/A
Sometimes (4)	20	15.27	15	8.24	N/A	N/A
Always (5)	5	3.82	17	9.34	N/A	N/A
Your faculty and staff						
Never (1)	27	20.61	22	12.09	N/A	N/A
Rarely (2)	24	18.32	32	17.58	N/A	N/A
Neutral (3)	41	31.30	43	23.63	N/A	N/A
Sometimes (4)	24	18.32	46	25.27	N/A	N/A
Always (5)	15	11.45	39	21.43	N/A	N/A
How familiar are you with the district's goal to minimize the amount fo waste, including food, sent to landfills?						
Not at all familiar (1)	N/A	N/A	N/A	N/A	4	3.54
Not very familiar (2)	N/A	N/A	N/A	N/A	21	18.58
Somewhat familiar (3)	N/A	N/A	N/A	N/A	56	49.56
Very familiar (4)	N/A	N/A	N/A	N/A	32	28.32

AUDIT PROCEDURES AND RAW DATA

1) Each school building will be sampled on three separate days during third and fourth quarter (beginning, middle and end)
2) Each building will be broken down into relevant zones
    a) Classrooms
    b) Office rooms
    c) Common spaces (e.g. hallway, library, core)
    d) Cafeteria
    e) Kitchen
3) A statistically significant number of rooms (>10%) will be selected from each zone through the use of a random number generator
4) On a given sample day, custodians will label and put aside the recycling bags and trash bags from selected rooms
5) All sample bags will be delivered to a central holding area (i.e., Mr. Bromley's room, Mrs. Cathey's room, etc.)
6) Audit supervisors will collect and organize the proper supplies
    a) Tarps
    b) Non-latex rubber gloves
    c) Five gallon buckets
    d) Trash bags
    e) Luggage scales
    f) Printed spreadsheets attached to clipboards
    g) Pencils and dry erase markers
    h) Dry erase boards
    i) Brooms
7) On a given analysis day, students will dissect and sort each sample bag according to category and will write any key observations
    a) Organics
    b) Office paper
    c) Paper product
    d) Glass, aluminum
    e) Aluminum cans
    f) Other metals
    g) Plastics #1-7
    h) Plastics with no #
8) For each zone, students will weigh (lb.) each category of waste utilizing a five gallon bucket and hand-held luggage scale
9) For each measurement, students will subtract the weight of each bucket from the mass total

HIGH SCHOOL WASTE AUDIT

Sampling date: February 13, 2020

Sampling location: classroom

Total # of classrooms: 75

Total # of sampled classrooms: 19

Sample Type	Disposal Bin	Organics (lb)	Office Paper (lb)	Paper Product (lb)	Glass (lb)	Aluminum Foil (lb)	Aluminum cans (lb)	Other metals (lb)	Plastics #1-7 (lb)	Plastics with no # (lb)
Raw (n=19)	White	1.3	9.0	1.9	0.5	0.0	1.0	0.0	3.5	1.4
Raw (n=19)	Black	5.8	0.1	4.0	0.7	0.1	0.6	0.0	1.3	3.5
Per room/day	White	0.1	0.5	0.1	0.0	0.0	0.1	0.0	0.2	0.1
Per room/day	Black	0.3	0.0	0.2	0.0	0.0	0.0	0.0	0.1	0.2
Class/day	White	5.1	35.5	7.5	2.0	0.0	3.9	0.0	13.8	5.5
Class/day	Black	22.9	0.4	15.8	2.8	0.4	2.4	0.0	5.1	13.8
Class/year	White	913.4	6,323.7	1,335.0	351.3	0.0	702.6	0.0	2,459.2	983.7
Class/year	Black	4,075.3	70.3	2,810.5	491.8	70.3	421.6	0.0	913.4	2,459.2
Total/year	White + Black	4,988.7	6,393.9	4,145.5	843.2	70.3	1,124.2	0.0	3,372.6	3,442.9

Sampling location: common areas

Total # of disposal bins: ?

Total # of sampled disposal bins: all

Sample Type	Disposal Bin	Organics (lb)	Office Paper (lb)	Paper Product (lb)	Glass (lb)	Aluminum Foil (lb)	Aluminum cans (lb)	Other metals (lb)	Plastics #1-7 (lb)	Plastics with no # (lb)
Raw	White	1.2	0.9	0.8	1.3	0.1	0.3	0.0	1.5	1.4
Raw	Black	1.9	0.0	2.1	0.0	0.2	0.0	0.0	1.5	3.5

Per year	White	213.6	160.2	142.4	231.4	17.8	53.4	0.0	267.0	249.2
Per year	Black	338.2	0.0	373.8	0.0	35.6	0.0	0.0	267.0	623.0
Total/ year	White + Black	551.8	160.2	516.2	231.4	53.4	53.4	0.0	534.0	872.2
Sampling location: offices **Total # of offices: 15** **Total # of offices sampled: 9**										
Sample Type	**Disposal Bin**	**Organics (lb)**	**Office Paper (lb)**	**Paper Product (lb)**	**Corrugated Cardboard (lb)**	**Aluminum Foil (lb)**	**Aluminum cans (lb)**	**Other metals (lb)**	**Plastics #1-7 (lb)**	**Plastics with no # (lb)**
Raw (n=9)	White	0.0	4.0	0.2	2.1	0.0	0.2	0.0	0.3	0.8
Raw (n=9)	Black	0.4	2.0	1.0	0.0	0.5	0.0	0.0	0.4	1.3
Per office/day	White	0.0	0.4	0.0	0.2	0.0	0.0	0.0	0.0	0.1
Per office/day	Black	0.0	0.2	0.1	0.0	0.1	0.0	0.0	0.0	0.1
Office/day	White	0.0	6.7	0.3	3.5	0.0	0.3	0.0	0.5	1.3
Office/day	Black	0.7	3.3	1.7	0.0	0.8	0.0	0.0	0.7	2.2
Office/year	White	0.0	1186.7	59.3	623.0	0.0	59.3	0.0	89.0	237.3
Office/year	Black	118.7	593.3	296.7	0.0	148.3	0.0	0.0	118.7	385.7
Total/year	White = Black	118.7	1780.0	356.0	623.0	148.3	59.3	0.0	207.7	623.0
Sampling date: February 19, 2020 **Sampling locations: cafeteria** **Total # of bins: 6** **Total # of sampled bins: 3**										
Sample Type	**Disposal Bin**	**Organics (lb)**	**Office Paper (lb)**	**Paper Product (lb)**	**Glass (lb)**	**Aluminum Foil (lb)**	**Aluminum cans (lb)**	**Other metals (lb)**	**Plastics #1-7 (lb)**	**Plastics with no # (lb)**

Raw	White	0.4	0.0	0.2	0.2	0.0	0.4	0.0	0.8	1.1
Raw	Black	4.3	0.0	1.6	0.0	0.1	0.0	0.0	1.1	2.0
Raw	Compost	7.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cafeteria/day	White	0.8	0.0	0.4	0.4	0.0	0.8	0.0	1.6	2.2
Cafeteria/ day	Black	8.6	0.0	3.2	0.0	0.2	0.0	0.0	2.2	4.0
Cafeteria/ day	Compost	14.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cafeteria/ year	White	142.4	0.0	71.2	71.2	0.0	142.4	0.0	284.8	391.6
Cafeteria/ year	Black	1,530.8	0.0	569.6	0.0	35.6	0.0	0.0	391.6	712.0
Cafeteria/ year	Compost	2,527.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total/year	White + Black + Compost	4,200.8	0.0	640.8	71.2	35.6	142.4	0.0	676.4	1,103.6