

North Carolina Public University and Community College Recycling and Solid Waste Report

Fiscal Years 2020-21 and 2021-22

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Executive Summary

This report presents recycling and waste data from public universities and community colleges in North Carolina in FY 2020-21 and FY 2021-22. During the past reporting cycle, 34 of 76 colleges and universities completed a survey administered by the N.C. Department of Environmental Quality's Division of Environmental Assistance and Customer Service (DEACS). The submitted surveys provided recycling and waste data for this summary report.

Figure 1. Materials Discarded, Recycled, or Reused by NC Public Colleges and Universities

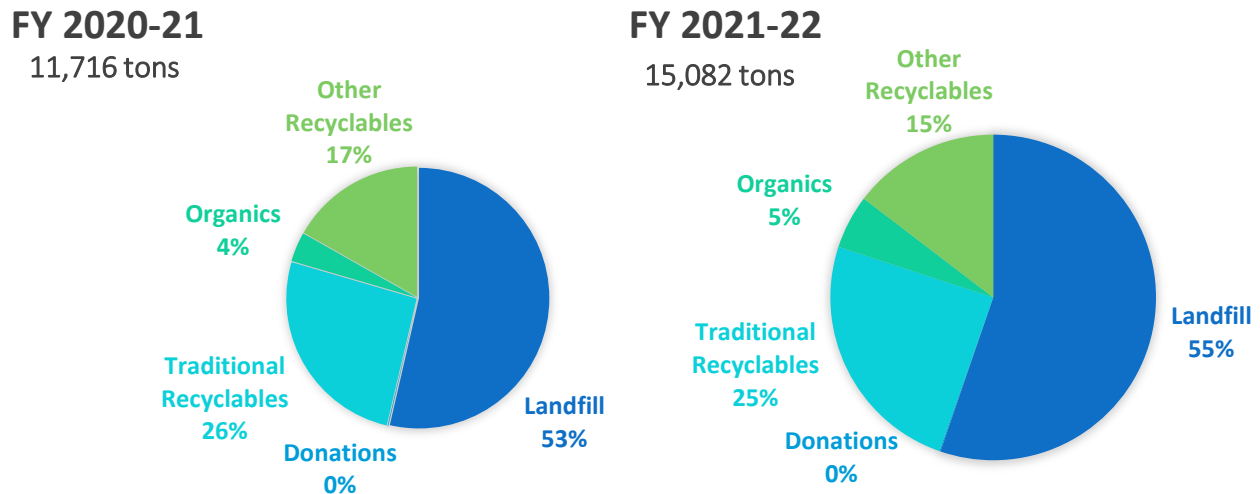


Figure 1, above, shows the amount and distribution of recyclable and solid waste materials managed by the 34 reporting schools. The chart shows that responding schools generated a total of 11,716 tons of material in FY 2020-21 and 15,082 in FY 2021-22. Of that total, 6,280 tons (54 percent) were sent to a landfill for disposal in FY 2020-21 and 8,333 tons (55 percent) in FY 2021-22. Still, 5,437 tons (46 percent) were recovered for reuse or recycling in FY 2020-21 and 6,749 tons (45 percent) in FY 2021-22. Although these numbers are lower than previous years, due in part to reduced response rate, the two-year survey illustrates schools are continuing to recover from the disruption caused by the COVID-19 pandemic.

The tons of material that responding schools recovered for reuse and recycling falls into one of four categories: traditional recyclables, organic material, other recyclable material, and donated material. Schools reported recycling 3,026 tons of traditional materials such as cans, bottles, paper, and cardboard in FY 2020-21 and 3,722 tons in FY 2021-22. Traditional recyclables, like the other categories, increased in tonnage but remained relatively steady in terms of the percentage of generated materials produced by schools. For instance, the amount of organic material nearly doubled from 430 tons in FY 2020-21 to 806 tons in FY 2021-22 but only increased by a percent of all material produced. Other non-traditional materials, like textiles, electronics, construction and demolition (C&D) materials actually decreased marginally as a percentage of materials generated from 17 to 15 percent. The last category of recovery, donated material, is the smallest, and because

of its scale, it is difficult to see any trends. Still, the tonnage of donated material increased very slightly from 11 tons in FY 2020-21 to 16 tons in FY 2021-22.

In compliance with N.C. General Statute 130A-309.14, each school has implemented some type of recycling program to capture traditional recyclables (paper, cardboard, plastic, metal cans, and glass bottles). Several schools have implemented practices to continually improve their recycling programs and achieve waste diversion beyond their statutory requirement:

- Seventy-seven percent of reporting schools have paired waste and recycling bins together, or “twinning” bins in some capacity – 24 percent have paired all on-campus waste and recycling bins while an additional 53 percent have at least paired some twinned bins;
- Forty-seven percent of all reporting schools have recycling bins in dining facilities and pedestrian walkways. Colleges and universities also frequently place recycling bins in academic and office buildings, athletic venues, and for special events.
- Approximately 30 percent of surveyed schools have programs to divert food waste from landfill disposal. Post-consumer dining hall collection is the most popular form of food waste diversion.

To improve the effectiveness and efficiency of recycling programs, DEACS recommends that colleges and universities budget to expand their recycling outreach, twin all their public bins, recover non-traditional recyclables, and donate reusable goods. While recommended, DEACS recognizes that school budgets may still be affected by the COVID-19 pandemic and may not have the funds to expand their recycling budgets. Schools can contact DEACS to learn how other programs have overcome similar challenges.

[About DEACS - RMMS](#)

The Recycling and Materials Management Section (RMMS) in N.C. DEQ’s Division of Environmental Assistance and Customer Service works with recycling businesses, local governments, and state agencies. The section provides data-based technical assistance to colleges and universities. Using data from this report, DEACS offers solutions to common recycling challenges such as contamination, low participation rates and implementation of new programs on college campuses. Staff members frequently make site visits to North Carolina colleges to offer face-to-face assistance, and staff also presents data and recycling strategies at regional conferences. Contact Delaney King (delaney.king@ncdenr.gov) with requests for technical assistance or data about collegiate recycling.

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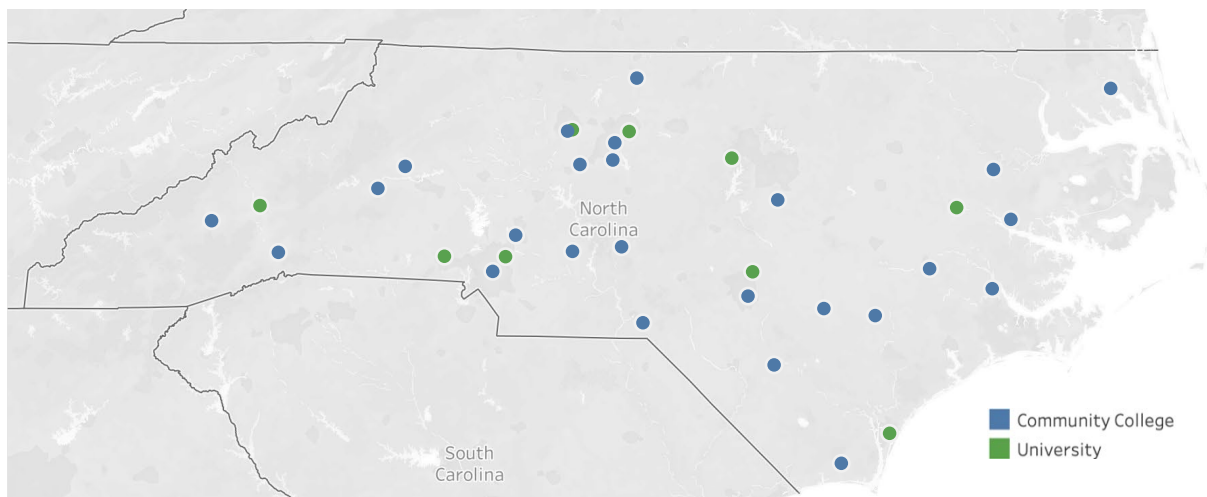
Introduction

State agencies are required by North Carolina General Statute 130A-309.14 to recycle office paper, newspaper, aluminum cans, glass, and plastic bottles. State agencies are also required to recycle fluorescent bulbs and must comply with statewide landfill bans, which prohibit the disposal of the following materials in landfills: used oil and oil filters, antifreeze, yard trash, wooden pallets, tires, lead acid batteries, plastic bottles, aluminum cans, televisions, and computer equipment.

Thirty-four public universities and colleges reported data in FY 2020-21 and FY 2021-22, which constitutes 45 percent of public collegiate entities.

A list of reporting schools is provided below. Reports are sent to the Division of Environmental Assistance and Customer Service (DEACS) and compiled for this summary report. While the reporting process is voluntary, it is worthwhile for all schools to collect data and track progress on their solid waste programs, costs, and diversion efforts. This data provides some perspective about how schools can improve their solid waste reduction and increase recycling.

Beaufort County Community College	Fayetteville Technical Community College	Rowan Cabarrus Community College
Bladen Community College	Forsyth Technical Community College	Sampson Community College
Blue Ridge Community College	Gaston College	Stanly Community College
Brunswick Community College	Guildford Tech Community College	UNC Asheville
Caldwell Community College and Technical Institute	Haywood Community College	UNC Chapel Hill
Central Piedmont Community College	James Sprunt Community College	UNC Charlotte
College of The Albemarle	Lenoir Community College	UNC Greensboro
Craven Community College	Martin Community College	UNC School of the Arts
Davidson-Davie Community College	Montgomery Community College	UNC Wilmington
East Carolina University	Randolph Community College	Wake Technical Community College
Fayetteville State University	Richmond Community College	Western Piedmont Community College
	Rockingham Community College	



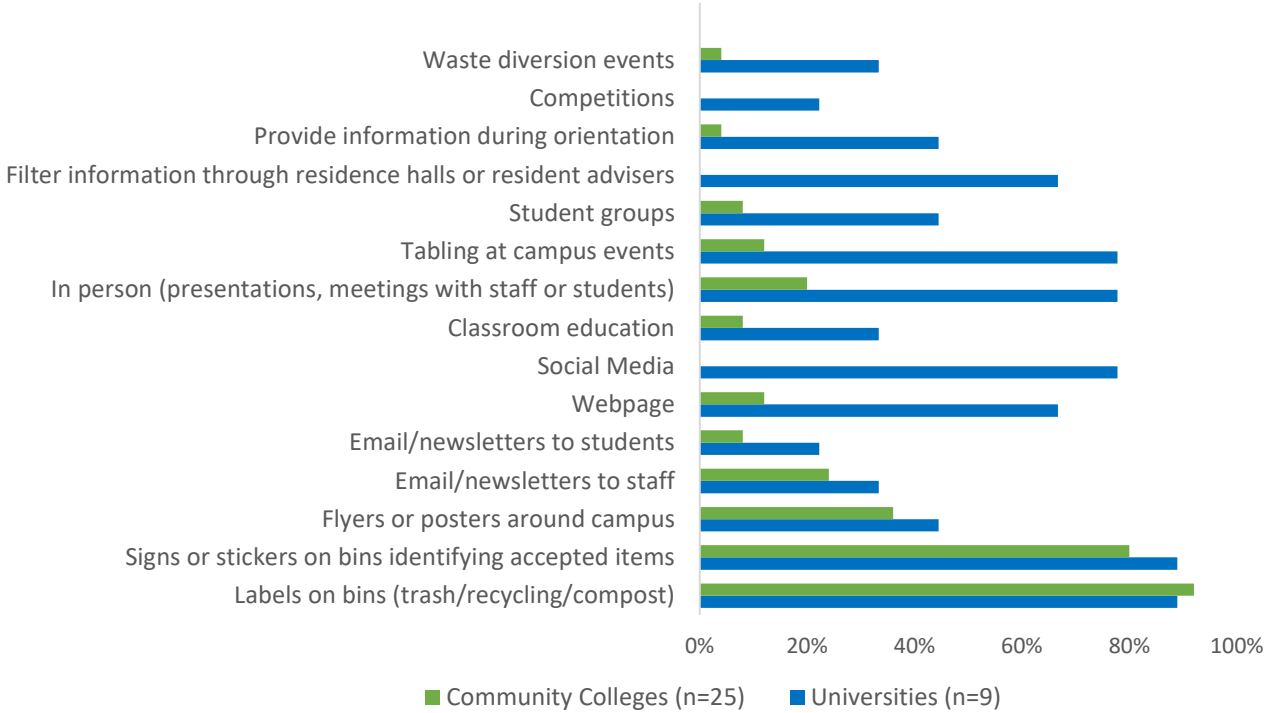
Education and Outreach

Education Methods

Education to students and employees is essential to operating a functioning recycling program on a college campus. Signage and various forms of outreach help people know what materials do and do not belong in the recycling bin. The absence of education outreach exacerbates problems such as contamination and low recycling rates. Because contamination lowers the value of recyclable materials or can make these materials unusable, recycling markets emphasize the importance of clean, non-contaminated recycling loads. Therefore, proper outreach and education is vital to ensure quality recyclable material.

Figure 2 identifies the various methods colleges and universities use in their education and outreach efforts. The most popular strategies among community colleges and universities are the use of labeling bins as well as using signs or stickers to identify acceptable items. This strategy is low-cost, requiring little financial or time investment from the institutions. Still, over 70 percent of residential colleges and universities surveyed also employ social media, in-person presentations or meetings, and tabling at campus events. The survey demonstrates higher educational institutions use a mix of print, online, and in-person outreach methods in their efforts to educate staff and students about appropriate recycling practices, but low-cost options are the most popular.

Figure 2. Waste Diversion and Recycling Education Strategies Used by NC Public Colleges and Universities



Outreach Campaigns

In addition to in-house education methods, the survey asked schools to report on any large-scale outreach campaigns used to educate people on their campuses. DEQ primarily uses the [Recycle Right NC](#) social marketing campaign, which focuses on reducing contamination in the recycling stream by informing the public about what is and is not recyclable. Nearly half of survey respondents report using the Recycle Right NC campaign. Schools also use national recycling campaigns, including Recyclemania, now known as [Campus Race to Zero](#), and America Recycles Day. Recyclemania is an eight-week national competition held each spring to encourage colleges and universities to benchmark and improve efforts to reduce or eliminate waste. America Recycles Day, celebrated on November 15, is a national initiative of Keep America Beautiful to promote and celebrate recycling. Keep America Beautiful offers promotional materials and guidance for event planning and education to all types of public and private organizations, including schools. Lastly, three public universities participated in and two received awards for the [Mascot Recycling Challenge](#) as part of the [Your Bottle Means Jobs](#) campaign in 2021- Appalachian State University, UNC Wilmington, and North Carolina State University. The challenge encourages schools to recycle plastic bottles and brings awareness to the economic and environmental benefits of recycling plastic bottles in the Carolinas.



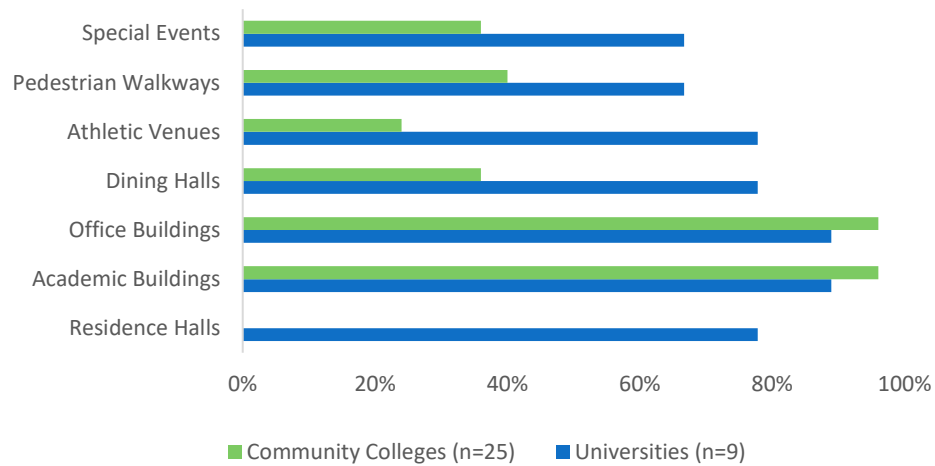
Traditional Recycling

Public Space Recycling

The recycling survey asked colleges to detail where people on campus had opportunities to recycle. Specifically, colleges reported where bins are publicly located, what buildings had recycling collection, and the percentage of recycling bins paired with waste bins.

Placing bins in public areas is a best practice because students, faculty, and staff often need the opportunities to recycle away from their desks, offices, and dorm rooms. While walking through campus, people are more inclined to recycle when a bin is nearby.

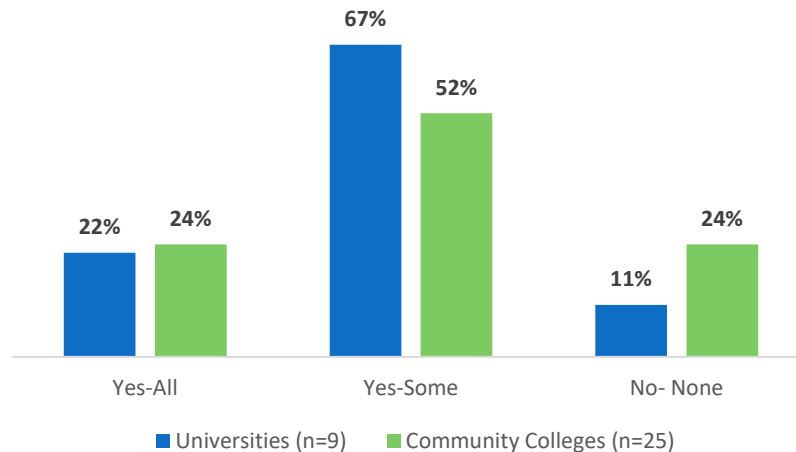
Figure 3. Recycling in Campus Spaces at NC Public Colleges and Universities



As Figure 3 illustrates, most surveyed residential colleges and universities have a wide variety of locations where individuals can easily recycle. More than two-thirds of residential respondents report recycle bins located in pedestrian walkways, athletic venues, dining halls, office buildings, academic buildings, residence halls, and at special events. In contrast, 96 percent of community colleges report bins located in office and academic buildings. Although a low percent of community colleges have recycle bins in other spaces, it is important to remember that their facilities differ from residential institutions, so they may have fewer areas to offer recycling opportunities.

Along with having recycling bins widely available, twinning bins – pairing recycling and waste bins side-by-side in public areas- is a best recycling practice. Waste bins are more prevalent in public areas, so when recycling bins are co-located with waste bins, people are more likely to recycle. Further, when recycle bins are located next to waste bins, they have lower contamination rates because people are less likely to discard trash in them. Lone recycling bins are often treated as trash cans.

Figure 4. Recycling and Trash Twin Bins on Campuses at NC Public Colleges and Universities



As Figure 4, above, demonstrates, around half of community colleges and nearly 70 percent of residential colleges and universities pair at least some of their bins. Over 20 percent of all respondents pair all their bins. Still, approximately 20 percent of schools, primarily community colleges, do not pair any of their waste and recycle bins.

Tons Recycled

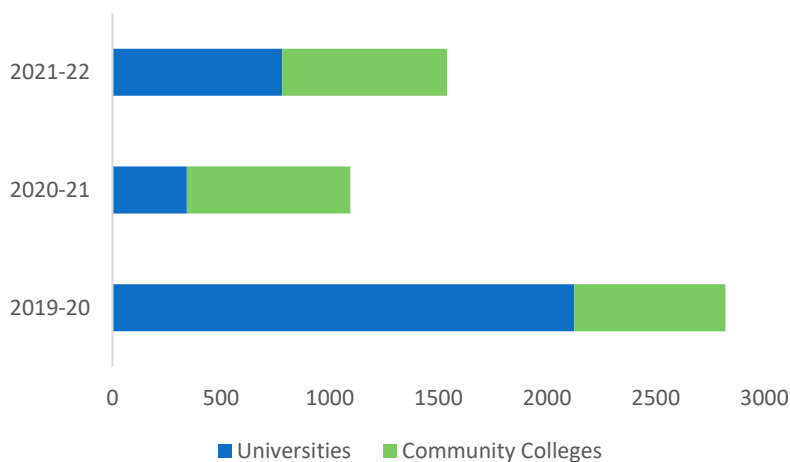
Responding colleges and universities reported recycling 3,026 tons of traditional recyclable material in FY 2020-21 and 3,722 tons in FY 2021-22. Although FY 2020-21 reports fewer tons than FY 2021-22, traditional recyclables as a percentage of total tons disposed, recycled, or reused, remains stable at approximately 25 percent.

However, both years' tonnage indicate a significant drop from FY 2019-20 likely due to the COVID-19 Pandemic. A side-by-side comparison of the 26 schools that participated in both FY 2019-20 and FY 2020-21 presents a 1,329 ton discrepancy. Total tonnage remains down from before the pandemic, but total traditional recyclables increased by approximately 300 tons between FY 2020-21 and FY 2021-22, indicating the amount of recyclables is recovering.

Recycling Collection Styles

Collegiate recycling programs collected most of their traditional recyclables in a single-stream system. In single-stream recycling, all traditional recyclable materials—cans, bottles and paper—are collected in the same receptacles. Single-stream, or commingled recycling, is convenient and simple for users. As a result, recycling participation increase with single-stream, and the system is more efficient since staff empties fewer receptacles.

Figure 5. Single Stream Recyclables Collected by NC Public Colleges and Universities (tons)



As shown in Figure 5, left, most schools used a commingled system and collected 1,094 tons in FY 2020-21 and 1,539 tons in FY 2021-22. Interestingly, the amount collected by community colleges remained relatively steady over the three-year period. Notably, in this comparison, the colleges reporting for fiscal years 2020-21 and 2021-22 are not identical to those reporting for fiscal year 2019-20. Despite more community colleges reporting for FY 2019-20, the amount of commingled materials

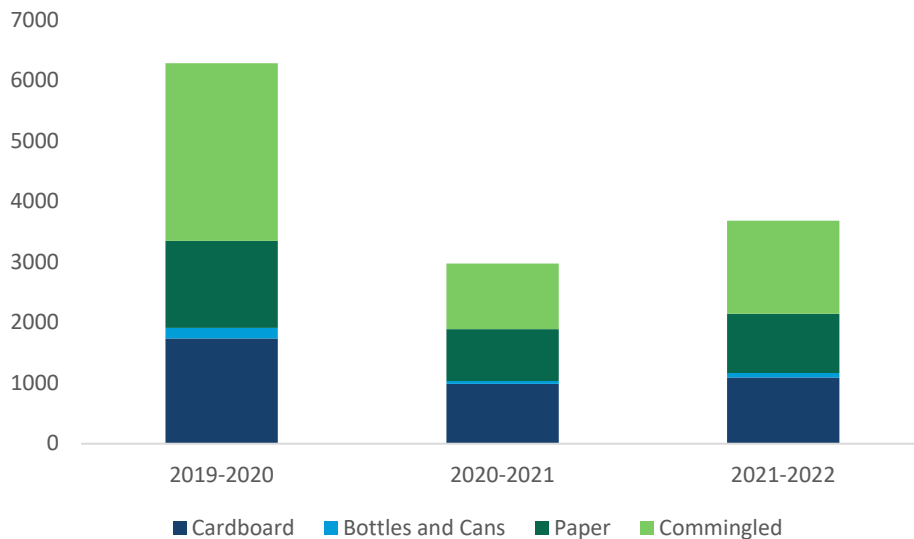
increased during the pandemic for reporting community colleges. Unsurprisingly, the amount of commingled materials residential colleges and universities reported in FY 2020-21 is incredibly low, but as with all tons recycled, commingled systems appear to be recovering from the disruption caused by the pandemic.

Collegiate recycling programs collected most of their traditional recyclables in a single-stream system. The materials collected in dual-stream or source-separated programs were grouped into the following categories:

- Containers, including aluminum cans, steel cans, glass bottles and plastic bottles;
- Cardboard, which is often collected separately from other materials;
- Shredded paper, which is often shredded and recycled by a private company; and
- Mixed paper, including office paper, newspaper and paper cartons.

As depicted in Figure 6 on the next page, schools report recycling 1,438 tons of fibrous materials in FY 2020-21 and 2,071 tons in FY 2021-22. They also report diverting 48 tons of containers in FY 2020-21 and 74 tons in FY 2021-22. Dual-stream collection is smaller in the two most recent years compared to FY 2019-20, but this is likely due to a smaller number of reporting schools rather than a decrease in dual-stream collection itself.

Figure 6. Traditional Recyclables Collected by NC Public Colleges and Universities (tons)



Other Recycling and Diversion

Waste diversion and recycling has expanded beyond the traditional materials diverted in previous decades. Colleges seek new methods to reduce, reuse and recycle quality materials, and several schools have adopted solid waste plans to divert as much material from landfills as possible. As a

result, organizations increased their recovery of materials like organics, electronics, construction and demolition waste, textiles, and hazardous waste.

Surplus and Donation

The N.C. Department of Administration’s [State Surplus Property Agency](#) is the seller of all surplus supplies, materials and equipment owned by the State of North Carolina. Through the surplus process, items that are no longer needed or useful are evaluated to determine the preferred disposition method. Reusing, trading-in, selling or recycling is prioritized over sending items to the landfill.

Colleges and universities have also created opportunities for reuse by establishing programs to donate student-generated materials to charity or other organizations. Schools reported donating approximately 11 tons of goods in FY 2020-21 and 16 tons of goods in FY 2021-22; these including things like donating winter coats to the Salvation Army. From that total, colleges and universities donated 8.7 tons of food to [food banks](#) and local shelters to feed hungry North Carolinians in FY 2020-21 and 7.6 tons in FY 2021-22.

Many schools reported donating additional goods but did not have access to the totals, so that tonnage is a low estimate of what schools actually donated. For example, Eastern Central University hosts a program for students to donate clothing and household goods to local charities during move-out, but they do not have the totals from the program. Moreover, the effects of COVID-19 also heavily impacted in-person donation events and prevented some donatable items from being collected.

Organics Recovery

Table 1. Organic Materials Recovered by NC Public Colleges and Universities (tons)

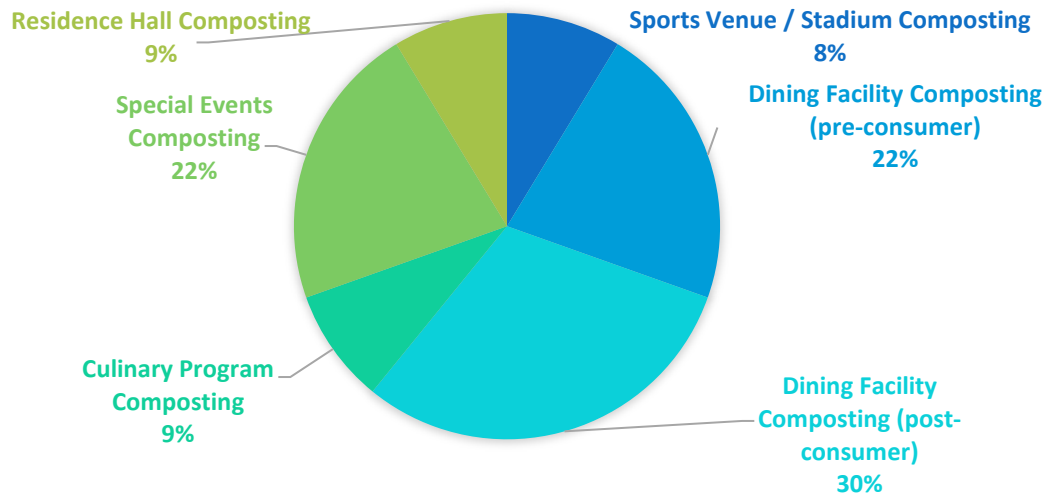
Year	School Type	Food Waste	Yard Waste	Total
2020-2021		109	222	331
	Universities	99	211	310
	Community Colleges	10	11	21
2021-2022		164	536	700
	Universities	154	525	679
	Community Colleges	10	11	21

Colleges feed thousands of people daily, and they have expansive campuses that produce leaves and brush clippings. Recovering this organic material has become important in the field of waste reduction.

Responding colleges and universities recovered 222 tons of yard waste in FY 2020-21 and 536 tons in FY 2021-22, and they recovered 109 tons of food waste (not including donated food) in FY 2020-21 and 164 tons in FY 2021-22. See Table 1 above.

For the annual survey, schools responded to questions asking about how they collect compostable material. Figure 7, below, shows the sites where universities and community colleges collected food waste.

Figure 7. Composting in Campus Spaces at NC Public Colleges and Universities



Seven out of the nine surveyed universities and three out of the twenty-five community colleges surveyed reported that they collect compostable food. Five universities and two community colleges collected food scraps from the dining room area (post-consumer), the most popular area for collection. Recycling programs typically locate compost bins with compostable liners next to trash and recycling stations for the diners' convenience. Also, five universities operate a back-of-the-house compost collection program in which kitchen staff collect scraps from food preparation. In a side-by-side comparison of the schools who responded to both the FY 2019-20 survey and FY 2020-21/2021-22 survey, three schools reduced or eliminated their compost programs, but one school expanded its program by adding post-consumer composting in its dining facility.

The higher cost for compostable liners is a common challenge for residence hall food scrap collection. Generally, compostable liners are more expensive than standard trash bags. Therefore, if a school were to consider implementing a residence or academic building compost program, program managers should consider the cost of liners in yearly budgets.

Special Waste

North Carolina General Statute 130A-309.10(f) bans many of these materials from landfill disposal in the state, so organizations must recycle items like electronic equipment, antifreeze, motor oil and filters, pallets, tires, and batteries.

Reporting schools recovered a total of 2,069 tons of special wastes in FY 2020-21 and 2,311 tons in FY 2021-22. Table 2 shows a breakdown of special wastes collected by colleges and universities.

Table 2. Special Materials Recovered from NC Public Colleges and Universities (tons)

Special Material	FY 2020-21	FY 2021-22
Used Cooking Oil	5.75	17.12
Pallets	93.00	89.00
C&D Recycling	624.38	360.85
Other Metal	576.30	631.63
Electronics	410.20	830.92
Auto Batteries	24.40	14.90
Dry Cell Batteries	2.38	5.39
Textiles	0.88	0.31
Motor Oil	3.04	5.77
Oil Filters	4.28	15.02
Anti-Freeze	0.16	0.32
Tires	13.47	17.10
Bulbs	7.56	3.37
Ink Cartridges	3.70	1.69
Expanded Polystyrene	6.13	5.74
Other Misc. Tons	292.94	311.75
Total	2068.57	2310.89

Disposal

Tons Disposed

According to the survey, North Carolina public colleges and universities disposed of 6,904 tons of material in FY 2020-21 and 8,694 tons in FY 2021-22. This tonnage includes both municipal solid waste (MSW) disposal and construction and demolition (C&D) waste disposal. Of that total, 6,280 tons (91 percent) were sent to a landfill for disposal in FY 2020-21 and 8,333 tons (96 percent) in FY 2021-22. The remaining 624 tons disposed (9 percent) in FY 2020-21 and 361 tons (4 percent) in FY 2021-22 went to C&D landfills.

The nine reporting universities are responsible for 55 percent of the MSW disposal in FY 2020-21 and 64 percent in FY 2021-22, while the 25 reporting community colleges are responsible for the remaining MSW material (45 percent in FY 21 and 36 percent in FY 22). Similarly, universities contribute more than three-quarters of C&D material with 78 percent in FY 2020-21 and 77 in FY 2021-22.

In FY 2020-21, universities had 104 pounds of MSW generated per person and community colleges had 84 pounds of MSW per person. The amount of solid waste generated per person increased during the next fiscal year. In FY 2021-22, responding universities generated 144 pounds per person, and responding community colleges generated 86 pounds per person of MSW. Compared to the last survey for FY 2019-20, universities generated fewer pounds per person, but community colleges produced more. To calculate the pounds per capita of MSW generated, population data includes full time equivalent staff (FTE) and students enrolled at the university or community college.

As colleges and universities continue tracking and estimating the amount of solid waste disposed, it is recommended that they consider the following best management practices:

- Include language in solid waste contracts to require monthly tonnage reports from the hauler. This can be actual weights if the capability exists or estimates from the hauler; or
- Request that the hauler periodically collects actual solid waste tonnage information. For example, during one week per quarter, the hauler collects all the school’s regularly scheduled pickups and takes that material directly to a scale to be weighed before servicing other customers on the route.

Waste Assessment

Waste assessment studies are valuable tools for agencies to learn what they are discarding in their waste stream and how much of that material is recyclable. Understanding what and where material is being thrown away can help colleges direct recycling strategies to recover the most material possible.

One university conducted a waste study in between 2020-2022, with two universities and two community colleges siting waste studies within the past few years. Two respondents indicated that COVID-19 prevented them from doing a planned waste study.

The study methodologies differ depending on the school. Some have contractors administer the study while others handle the audit internally. Best practices include measuring waste from several different types of buildings across several months. Studying various building types will provide more robust data about the nature of disposal across campus. Diversifying the times of year studied will show how waste and recycling rates differ from month-to-month.

Schools seeking advice on waste characterization studies can contact DEACS, which has data from other school and local government waste assessments, and staff can assist in identifying a partner organization to help with the study.

Summary and Recommendations

Based on reports submitted by 34 universities and community colleges, data shows that recycling and waste generation decreased during FY 2020-21 and FY 2021-22 compared to the previous fiscal year.

Of the 11,716 total tons of material generated by reporting colleges and universities in FY 2020-21, they recovered 46 percent of

Table 3. Materials Generated by NC Public Colleges and Universities (tons)

Material	FY 2020-21	FY 2021-22
Total Material Generated	11716.44	15081.94
Traditional Recyclables	3026.16	3721.59
Organic Materials	429.75	806.12
Other Recyclables	1969.82	2204.77
Donated Goods	11.21	16.06
Disposed Waste	6279.51	8333.40

materials. In FY 2021-22, reporting schools generated 15,082 tons of material and recovered 45 percent of materials. Table 3 provides a summary of materials generated by category. The data are significantly lower than past years, but on a per capita solid waste basis the data are mixed. Universities generated fewer pounds of MSW per person than previous years, but community colleges generated more than previous years. This highlights the effect the COVID-19 pandemic had on solid waste and recycling generation but also indicates schools are continuing to recover from the pandemic.

Schools with the highest rates of diversion practiced a few common best practices:

1) Abundant outreach – Most schools placed signage or labels directly on bins, but the highest performing college recycling programs invested in educational materials beyond information at recycling stations. DEACS encourages public recycling systems to:

- a. Budget about \$1 for outreach for every student and employee under its purview;
- b. Expand outreach efforts beyond signage at recycling stations; and
- c. Use clear and consistent messaging to avoid confusion.

2) Work with your MRF operator – Schools can work with the operator of their MRF to create a service contract for long-term stability for both organizations and create uniform messaging about recycling based on the accepted materials for the MRF.

3) Twinned bins – Twinned bins in public spaces have several benefits.

- a. People are more likely to recycle if given the opportunity. Recycling bins next to trash bins reminds people that certain items belong in the recycling container.
- b. People are less likely to treat a twinned recycling bin as a garbage can. If a recycling bin is left alone without a trash bin, people are more likely to throw garbage—food and non-recyclable waste—into the recycling container. Any contamination diminishes the quality of the entire recycling mix.
- c. Public-space recycling bins remind people to recycle. Seeing recycling bins next to trash bins in public may remind them to recycle at home too.

4) Recover non-traditional materials – Much of the increases in collegiate recycling during the past several years stem from expansions in non-traditional recycling. Several public and private colleges have proven the effectiveness of on-site composting and partnerships with commercial composters. Colleges can also work with contracted food service providers to determine an organics management plan at their dining halls.

5) Donation and reuse of materials – Reusing commodities is more environmentally sustainable than throwing them away. Colleges and universities should use contracts and services available through the State Surplus Property Agency and Division of Purchasing and Contract to manage office furniture and supplies, equipment, vehicles, and special recyclables such as scrap metal, motor oil and filters, electronics, and fluorescent bulbs. Food banks also accept edible pre-consumer food across the state. DEACS encourages colleges to measure their tonnage of donations to better estimate their waste reduction progress.

6) Peer-to-peer collaboration – A key objective of DEACS is to foster inter-organizational collaboration for colleges and universities to encourage the employment of best management practices for waste reduction. One entity may face a challenging recycling problem, while another may have already solved a similar obstacle.

a. **Collegiate Recyclers Coalition** – One opportunity for connecting is through the Collegiate Recyclers Coalition (CRC), a council of the Carolina Recycling Association. The CRC holds quarterly meetings and an annual workshop to share information and network with related partners. More information can be found by contacting [DEACS](#) , or visiting the [CRC website](#).

b. **MRFshed collaboration** – A MRFshed includes all communities that feed recyclables to a single MRF. DEACS encourages colleges and universities to work with their surrounding community, haulers, and regional MRF to use a common set of educational recycling materials. This will help provide consistent messaging and reduce confusion for students, faculty and staff that live, work and spend time both on-campus and in the surrounding community.