RISRC Assessment of Wasted Food in RI Public Schools

Executive Summary

Food waste in the Unites States is a problem in need of solutions.

- 1 in 6 Americans is food insecure.
- Food production accounts for 50% of the land use in the US.
- A whopping 35-40% of food produced in the US is wasted and most of it ends up in landfills
- Food waste in landfills produces methane gas, a more powerful greenhouse gas than even CO2.

Although there is more food waste to be found in other areas of the food economy such as households, restaurants and supermarkets, schools provide an excellent opportunity to introduce the problem of wasted food, measure it, and identify and implement solutions that engage and influence students to create sustainable habits for the future.

In April and May 2019, the RI Schools Recycling Club conducted 15 comprehensive Food Scrap Audits in three public school districts (Urban, Suburban & Rural) to measure how much food is being wasted every day at school lunches in Rhode Island's Elementary, Middle and High Schools.

We extrapolated the data to estimate how much food is being wasted by students in individual schools, entire school districts and all of Rhode Island over the course of the school year; measurements that can inform schools as they develop strategies to reduce the amount of food waste they send to the landfill.

Independent of the assessments, we discovered several Rhode Island schools are currently diverting food waste; **Narragansett Elementary School** is sending wasted food to Earth Care Farm in Charlestown for composting; **Burrillville, North Smithfield, Cumberland and Woonsocket Schools** are sending food scraps to Blue Heaven Farm in Pascoag to feed pigs and **Barrington Elementary Schools** are sending food scraps to a nearby farm for composting.

Methodology

For the study, RISRC selected three school districts – one urban, one suburban and one rural to reflect different student populations. The audits took place over five consecutive days in each district in a mix of Elementary, Middle and High Schools.

Wasted food was diverted into five categories; 1) Liquids, 2) Fruit & Vegetable scraps, 3) All Other Food scraps, 4) Unopened, Untouched Food and 5) Home lunch scraps.

We recognize that the amount of wasted food in a school lunchroom can vary day to day in consideration of more or less popular menu items. On two occasions RISRC conducted back-to-back lunch audits at the same school.

- In one Middle School we measured 71.4 lbs. of wasted food on Monday, May 20th and 62.2 lbs. of wasted food the next day, a variance of 9.2 lbs. (6% from the average).
- In another Middle School we measured 64.1 lbs. of wasted food on Monday, May 13th and 73.5 lbs. of wasted food the next day, a variance of 9.4 lbs. (6% from the average).

And finally, we used two different calculations for the measurement of "food waste per student."

1. Wasted Food per school divided by the number of students served that day (WPS/Served). This is naturally the more accurate measure of student waste because it divides total food waste by the number of students eating school lunch.
2. Wasted Food per school divided by the school's enrollment (WPS/Enroll). This measurement is commonly used in studies because it facilitates comparison and benchmarking with other states and school districts. Furthermore, it addresses the issue of overproduction of food by food service providers due to unplanned student absences.

Findings

Wasted food represented **79%** of the total waste coming out of the 15 lunchrooms we audited. Recycling represented **7%** and Trash, **14%**.

Total wasted food over 15 school audits by category:

	Total Daily Wasted	% Total
All Other Food Scraps (Pizza, Bread, Meats, etc.)	418.3 lbs.	25%
Fruits and Vegetables	332.3 lbs.	20%
Liquids (Milk, Chocolate Milk, Water, Juices)*	299.2 lbs.	17%
Recoverable Food (Milk, Fruits, Yogurt, etc.)	295 lbs.	17%

Home lunch food waste	51.4 lbs.	7%

*When liquids are disposed of in the lunch waste it is absorbed into the food adding considerable weight.

Waste per Student:

Waste per student provides us with a basis to compare food waste in different schools in Rhode Island and nationally. It will also be the factor we use to extrapolate estimates of total food waste in all public schools in Rhode Island.

Based on the data we collected in the urban, suburban and rural school districts, the average wasted food per student in Rhode Island is **34.5 lbs. per year**, 5% less than the national average of **36.5 lbs. per year**. *(Source: Farmtoschool.org 10/18)*

However, when compared to Vermont, Rhode Island's schools produce more waste per elementary and middle schooler.

Annual Food Waste per Student Enrollment

	RI	VT
Elementary School	47 lbs.	40.6 lbs.
Middle School	39.3 lbs.	26.2 lbs.
High School	15.6 lbs.	12.6 lbs.

https://recyclingworksma.com/food-waste-estimation-guide/#Jump5

RISRC Food Audit Data

On a waste per student served basis, RI's rural schools produced the most wasted food followed by urban and then suburban schools.

Daily Wasted Food per Student Served

	WPS / Served
Rural Schools	.42 lbs.
Urban Schools	.40 lbs.
Suburban Schools	.37 lbs.

The younger students in elementary and middle schools produce more wasted food than high schoolers.

	Daily WPS / Served	Daily WPS / Enroll.
Elementary Schools	.48 lbs.	.26 lbs.
Middle Schools	.39 lbs	.22 lbs.
High Schools	.23 lbs.	.09 lbs.

Why is this the case? We noted that the average weight of lunches in elementary, middle and high schools was consistent at 1.1 lbs. The fact that 6- and 7-year-old students are receiving the same amount of food as 17-year-old students helps explain why younger students are wasting more food.

School Lunch Participation Rates

Urban schools had the greatest percentage of students participating in school lunch, followed by Rural and Suburban Schools with similar participation rates.

	% School Lunch Participation
Urban Schools	58%
Rural Schools	35%
Suburban Schools	35%

Home Lunch

The suburban schools produced the greatest percentage of home lunch waste followed by rural schools. Urban schools produced almost no home lunch waste.

	% Home Lunch food waste of total waste
Suburban	12%
Rural	5%
Urban	1%

Daily Data to Annual Extrapolation

Factoring "waste per student enrolled" for Elementary, Middle and High Schoolers with current 2018/19 RI public school enrollment numbers for Elementary, Middle and High Schools in Rhode Island, we estimate daily food waste produced by RI's Public Schools at **13.7 tons.**

Using the minimum required Public School year of 180 Days, we estimate the annual food waste produced by RI's Public Schools at **2,467 tons.** *(see table below)*

RI Public School Wasted Food / WPS Served

	Enroll.	% Served	Served	Daily WPS Served	Daily Wasted Food (tons)	Annual Wasted Food (tons)
Elementary	62,499	55%	34,164	0.48	8.15	1467
Middle	33,057	56%	18,527	0.39	3.61	650
High	44,975	38%	17,195	0.23	1.94	350
Total	140,531		69,886		**13.7**	**2467**

Another way to look at the differences in food waste per student offers additional insight into where most of the waste in RI Public Schools is happening.

	% of all students	% of food waste
Elementary school students	44.5%	59.5%
Middle school students	23.5%	26.3%
High School students	32%	14.2%

Economic Values / Costs

Although wasted food can be shared with hungrier students, donated to food banks, used to feed livestock, produce energy via anaerobic digesting and turned to compost, it currently has no economic value and represents a cost to schools for transportation and in some cases tipping fees.

Hauling fees

Each of the schools that are currently diverting food scraps are paying between $85 and $100 per month to have the food scraps collected and transported away.

Disposal fees

Landfill - At current municipal tipping fees for the Johnston landfill of $47 per ton. We estimate annual tipping fees for the food waste produced by all RI Public Schools to be $115,836.

Earth Care Farm – The current tipping fee for food scraps to be composted is $40 per ton, a savings of just $7 per ton compared to the landfill. When you add transportation costs, it becomes more costly to divert food scraps for commercial composting.

Blue Heaven Farm – There is no tipping fee for diverting food scraps for animal feed.

For **Woonsocket Schools** which divert food scraps to Blue Heaven Pig Farms, there is only a transportation fee of $25 per week per school. Without a tipping fee, this represents a modest cost savings by diverting from the landfill and saving those tipping fees.

However, **Narragansett Elementary School**, by sending food scraps to Earth Care Farms for composting, incurs both transportation and tipping fee costs. After factoring in savings from landfill tipping fees, this creates an additional annual expense of approximately $900.

Recoverable Food (Unopened/Untouched)

On a daily basis each school district produced recoverable food that could be diverted to “share tables” in the school lunchrooms for hungry students and to local food pantries in food insecure communities.

	Daily Recoverable Food
Urban School District	212 lbs.
Rural School District	46.6 lbs.
Suburban School District	36.0 lbs.

Summary – Reducing, Recovering & Recycling Wasted Food

Categorizing and quantifying wasted food in Rhode Island public schools provides data that is helpful in developing solutions to minimize and divert food waste from the landfill in a number of ways:

1. It informs the writing of effective food waste disposal legislation.
2. It quantifies the recoverable food that could be donated to Rhode Islanders who are food insecure.
3. It provides data that will help school districts develop plans to reduce, recover and recycle effectively.

Legislation: The data was helpful to state representative Lauren Carson in writing bill "175-School Waste Recycling" that will require schools to divert organic waste from the landfill.

The legislation, which has not yet passed, mandates that beginning in 2020, "educational entities" generating not less than 30 tons of organic waste per year divert food waste from the landfill.

Initially, an "educational entity" referred to an individual school. This study determined that no single school in RI generates that much waste annually. However, by expanding the definition of educational entity to include entire school districts, 19 RI Public School districts qualify, representing 77% of the total organic waste generated annually.

Representative Carson has made this change and the bill is pending approval in 2020.

Recoverable Food (Unopened/Untouched): On a daily basis each school produced a significant amount of food waste that was unopened (yogurt, milk, wrapped fruits & cheese). A portion of this food was made available to hungry students on "share tables" in the cafeterias. However, most of it gets thrown out.

During our food waste audits, we contacted local food pantries who were delighted to receive the yogurt, milk, wrapped fruits & cheese and interested to continue receiving unused and unopened food not being consumed at local schools.

The three school districts in our study generate 26.6 tons of recoverable food annually. That extrapolates to 388 tons of recoverable food generated annually by all RI Public Schools.

Clearly, this is a win-win opportunity that can and should be implemented.

Useful Data for Schools: Armed with this data, schools can understand the scope of the challenge and begin to create plans for diverting food waste from the landfill.

We proposed the RI Schools Recycling Club assessment of food waste as the first step of a three-part program to effectively reduce, reuse and recycle organic waste in RI schools.

In phase II we plan to engage schools in a challenge to create their own food waste diversion programs using best practices from The USDA, EPA, The Center for Eco Technology, Smarter Lunchrooms, Food Bus and more.

In phase III we will measure the results, spotlight success stories and continue to nudge more and more schools to participate.

While K-12 Public Schools produce only a small percentage of the wasted food in the U.S. they have a special role in not only reducing and recycling food waste, but also in educating the next generation about recovering wholesome excess food for donation and about reducing food waste to conserve natural resources.

RI Urban Schools Food Scrap Audits

Based on the five daily audits conducted by RISRC from 4/22-4/26/19 and extrapolating for a 180-day school year, we estimate the five urban schools (two middle schools, two elementary schools and one high school) we audited produce approximately 80.5 tons of wasted food annually.

- 61.4 tons of wasted food scraps & liquids
- 19.1 tons of recoverable food

Annual weight by food/waste type:

- Liquids (mostly milk) 16.7 tons
- Fruits & Veggies 19.5 tons
- All other food scraps 25.2 tons
- Recycling 5.5 tons
- Recoverable food & milk 19.1 tons
- Trash 12.3 tons

Comparison of Elementary, Middle School and High School food waste per student:
Food waste per student is calculated two ways; the first factors "school enrollment" and the second "students served school lunch."

	Enroll	Served
Elementary schools produce the most wasted food per student:	66.1 lbs.	88.8 lbs.
Middle schoolers rank second highest:	56.6 lbs.	90.3 lbs.
High schoolers produce the least:	17.4 lbs.	37.8 lbs.

Diversion Savings:
By diverting 80.5 tons of food scraps and recoverable food away from the landfill, this urban school district would save approximately $3,783 in tipping fees at the current municipal rate of $47/ton.

RHODE ISLAND SCHOOLS RECYCLING CLUB

RI Suburban Schools Food Scrap Audits

Based on the five daily audits conducted by RISRC from 5/13 – 5/17/19 and extrapolating for a 180-day school year, we estimate the three rural public schools (elementary, middle and high school) we audited produce approximately 15.1 Tons of wasted food annually.

- 11.9 tons of wasted food scraps & liquids
- 3.2 tons of recoverable food

Annual weight by food/waste type:

- Liquids (mostly milk) 3.6 tons
- Fruits & Veggies 3.7 tons
- All other food scraps 4.5 tons
- Recycling 1.4 tons
- Recoverable food & milk 3.2 tons
- Trash 3.4 tons

Comparison of Elementary, Middle School and High School annual food waste per student:
Food waste per student is calculated two ways; the first factors "school enrollment" and the second "students served school lunch."

	Enroll	Served
Middle schoolers produce the most wasted food per student:	31.2 lbs.	92.9 lbs.
Elementary schoolers rank second highest:	31 lbs.	78.2 lbs.
High schoolers produce the least:	10.1 lbs.	30.7 lbs

Diversion Savings:
By diverting 15.1 tons of food scraps and recoverable food away from the landfill, this urban school district would save approximately $705.00 in tipping fees at the current municipal rate of $47/ton.

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RI Rural Schools Food Scrap Audits

Based on the five daily audits conducted by RISRC from 5/20-5/24/19 and extrapolating for a 180-day school year, we estimate the four rural Public Schools (two elementary schools, one middle school and one high school) we audited produce approximately 25.4 Tons of wasted food annually.

- 21.2 tons of wasted food scraps & liquids
- 4.2 tons of recoverable food

Annual weight by food/waste type:

- Liquids (mostly milk) 6.7 tons
- Fruits & Veggies 6.6 tons
- All other food scraps 7.9 tons
- Recycling 3.3 tons
- Recoverable food & milk 4.2 tons
- Trash 6.3 tons

Comparison of Elementary, Middle School and High School annual food waste per student:
Food waste per student is calculated two ways; the first factors "school enrollment" and the second "students served school lunch."

	Enroll	Served
Elementary schoolers produce the most wasted food per student:	44.1 lbs.	88 lbs.
Middle schoolers rank second highest:	22.7 lbs.	70.8 lbs.
High schoolers produce the least although not by much:	14.9 lbs.	59.4 lbs.

Diversion Savings:
By diverting 25.4 tons of food scraps and recoverable food away from the landfill, this rural school district would save approximately $1,193.80 in tipping fees at the current municipal rate of $47/ton.