Zero Waste Schools
PLASTIC WASTE AUDIT
TEACHER GUIDE

A citizen science project that looks at plastic waste, it's impact, and solutions.

ESSENTIAL QUESTION

How much plastic do you see used daily in your home, school and in businesses that serve your community? How do you think all this plastic effects the environment?

OBJECTIVE

Through conducting a Plastic Waste Audit, students will be able to identify and quantify the many different types of plastics used during a school lunch service. Using data from the audit, students will create a campaign to increase awareness of the environmental impact of plastics and take action to reduce plastics in their daily lives.

KEY DETAILS

Grade Level: K-12
Subjects: Science, English Language, Arts, Math, Green Team

Time Considerations:
Total Length of time: 1 hour 40 minutes or 2 class periods (approx.)

Planning: 40mins or 1 class period
Set up: 20 mins
Waste Audit: 1 or more 40-minute periods

OPTIONAL: Film Screening, Community and/or Beach Clean Up

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BACKGROUND

In the United States, plastic production has increased dramatically since the 1950s. Plastic is such a commonplace part of our lives that we may not be aware just how much plastic we use each and every day – much of it designed to be used only once and then thrown away. While many plastic items are in our hands for only a short while, they persist in the environment, never fully breaking down, getting smaller and smaller and making their way into our environment, food system and bodies. Made from petroleum, plastic items are contributing to environmental degradation around the world, in all parts of their lifecycle from extraction to disposal. But we CAN use less plastic. Measuring to understand and manage the problem is the first step.

Further Reading: Yale Climate Connection – How Plastics Contribute to Climate Change*

MATERIALS

- Clipboard and pen
- Plastic Waste Audit Data Sheet
- Gloves and sanitizer
- Tablet or camera
- Boxes or bags
- Clicker counters
- Plastic waste category signs
- Recycling signs for the blue waste stream (metal, hard plastic and cartons) and the trash only waste stream (soft plastics)
- Kitchen scale for weighing (optional)

VOCABULARY

AUDIT (noun or verb) a careful check or review

WASTE (noun) material left over, rejected, or thrown away

PLASTIC (noun) a chemical compound. A plastic is a kind of material that is made by people. It can be formed into almost any shape and object, film, or fiber

SOFT PLASTICS (noun) soft, flexible, lightweight materials; noted for flexibility and toughness. Some soft plastics included with school meals: sandwich wrap, prepackaged snacks, sauce packets, bagged carrots and apples, etc.

HARD PLASTICS (noun) for the most part won't bend. Some hard plastics included with school meals: hummus container, cups that hold water, or fruit, or vegetables, etc.

RECYCLING (verb) the collection and reprocessing of discarded materials for reuse. Recycling helps reduce pollution, prolong the usefulness of landfills, and conserve natural resources.

LANDFILL (noun) a managed waste disposal site for unwanted or discarded materials. A sanitary landfill is an engineered facility that is designed and operated according to regulatory standards and guidelines.

LANDFILL DIVERSION (verb) the process of redirecting waste that is suitable for recycling, composting, or reuse instead of sending it to landfill.

* https://yaleclimateconnections.org/2019/08/how-plastics-contribute-to-climate-change/
**https://www1.nyc.gov/assets/dsny/site/resources/educational-materials/school-recycling-materials

PROCEDURE

A. Planning

(Estimated time: 40 mins or 1 class period)

- ☐ Speak with your school administration about your plan to conduct a plastic waste audit.
- ☐ Recruit students to form a plastic waste audit team, such as through your school's Green Team or student council.
- ☐ Decide what lunch period you are going to audit and if you will be auditing the entire population in the cafeteria or taking a sample from one or more tables/classes.
- ☐ Meet with your school custodians and Office of Food and Nutrition Services (OFNS) team to discuss your plastic waste audit plans and request any materials, such as extra bags and bins. Find and assemble any other necessary materials.
- ☐ Meet as a full waste audit team to review the flow of the waste audit, the different roles, any rules, and the plan for how you will communicate with your school community.
- ☐ Notify the AP, Dean or School Aide that is in charge during the meal period when the plastic waste audit is scheduled and discuss any requirements you have of them for the day.
- ☐ Make morning announcements and/or create posters to communicate to your school community in the lead up to your waste audit.

Plastic Waste Audit Suggested Roles and Responsibilities:

Project Lead/s –talk with OFNS Manager or Cook, supervise plastic waste audit to ensure all audit goals are met

Communications - create posters and make announcements in the morning and during lunch; create posts for social media or a bulletin board showing the process of the audit and what was learned

Photographer/s – capture images of meetings, plastic waste items and the plastic waste audit.

Auditor/s - Help students to separate out their plastics into specific bins. If needed pull and resort any incorrectly placed items.

Data Collector/s – record counts of plastic items on the plastic waste audit data sheet and make calculations for total number of plastic items.

B. Setting Up

(Estimated time: 20 minutes)

- ☐ Arrive early to the cafeteria and take a picture of the meal(s) being served, including all the different plastic items.
- ☐ Set up a labeled space – this can be a waste sorting station or a set of labeled boxes on a table - for collecting plastics separated by type
- ☐ Review the plastic waste audit data collection sheet with your team and the roles of each team member. Divide students into those roles.
- ☐ At the beginning of the period, announce again that you are doing a food waste audit! This helps set everyone's expectation that you need their patience while throwing out their waste.

C. Waste Audit

(Estimated time: 1 or more lunch periods)

- ☐ At the beginning of the period, take note of the types of plastics you are seeing in the meal service for the day. Make sure that you have those items identified on your waste audit sheet and if not, write or draw the missing item in the space provided.
- ☐ When students come up to throw out their waste, direct them to sort their plastic into the separate bins or boxes that you have set up. Make sure packages are opened and food is emptied out before collecting.
- ☐ Tally the number of each type of plastic on the **Data Collection Sheet** and record in Typeform. Use the calculations on the data sheet to find out the potential amount of plastic used in your school over the course of a week, the entire school year.
- ☐ Be sure to take pictures of all the plastic that you have collected to include when you share your data.
- ☐ Clean up! Recycling all hard plastics and milk cartons. Throw all soft plastics in the landfill bin. Wipe down any surfaces that were used for the audit.

ADAPTATIONS

Issue	Adaptation
Cafeteria doesn't have space for a complete waste audit setup.	Assign students to go around to tables to count or collect plastic items.
Too many students to feasibly measure all the waste.	Choose a sample of a small group of students (e.g. a couple tables, a single class, just the Green Team) to conduct the waste audit with. Use the following equation to multiply your sample results to get an estimate of the total amount of plastic waste for the day. $$\frac{(\#plastic\ item\ counted)}{(\#stuents\ sampled)} = \frac{(total\ number\ of\ plastic\ item)}{(total\ \#students\ in\ school)}$$
Students are unable to sort items into different bins.	Assign student auditors to each count one group of the plastic items from the data sheet. Using clicker counters or recording with tally marks can be helpful. Students can stand by a waste sorting station and count as items are disposed of, or they can walk around the cafeteria to count at tables during the lunch period.

CHECK FOR UNDERSTANDING

- How much plastic was used during your lunch period?
- Why does plastic waste get disposed of in different bins?
- Why do you think our food and drinks are packaged in plastic?
- How does the plastic we discard daily affect our environment?
- How much plastic would be used in your school over a week? A month? A full school year?
- What are ways you could reduce plastics in your school?

POST-AUDIT ACTIVITIES

- Share your plastic waste audit findings with your school community through posters, announcements, or another type of awareness campaign. See our appendix for campaign ideas.

AUDIT ALLIES SCRIPT

This script can be used to help students feel comfortable approaching DOE Office of Food and Nutrition Services (OFNS) staff. Having students speak with OFNS is a great leadership opportunity and will further give purpose and depth to the reasons why the Plastic Waste Audit is being conducted.

Good morning/afternoon,

My name is [insert student name], I am a member of the school's Green Team/Plastic Waste Audit Team and I am here because we are working on a cool project where we will be taking a look at the different plastics that are used during meals. We want to learn more about how plastic waste affects our school community and our city. We also want to raise awareness and be advocates on how we can reduce our use of plastic.

May I please speak with someone who can help my team and I know how many meals will be given out during [insert meal-time and date]? We need that information to do some math! We would also like to know what is on the menu for that meal-time.

Thank you so much for helping us. We appreciate everything that you do for our school and are happy that we get to work together on this!

What other stakeholders might the Green Team need to speak with in advance of your waste audit? Students can modify the above script to speak to administrators, schools aides and members of the custodial team. Be sure to include information about what you are doing, why you are doing it, what you need from them and to thank them for helping with the project.

PLASTICS FACTS

Where exactly does plastic come from? What are all of the ways that it affects our planet? Here are some FACTS. Can you find more?

1. Plastic is made from oil and natural gas.
2. Oil and natural gas are **fossil fuels** which are found beneath the land or ocean floor.
3. A fossil fuel is a material that is formed over millions of years as heat and pressure of the Earth affect and change the ancient remains of animals and plants. These animals and plants were so ancient that they lived on Earth before the dinosaurs!
4. ossil fuels are a type of resource known as **non-renewable**. What this means is that once fossil fuels "finish" or are completely used up, there are no more for the future. Nature cannot make fossil fuels fast enough so that there is enough for people to use.
5. The construction of oil drilling sites require the use of heavy equipment which can destroy big areas of wilderness and forests.
6. Oil spills have a huge negative impact on wildlife and cause long-term damage to marine ecosystems. An example of this was the big spill of the company BP in the Gulf of Mexico in 2010. According to The Wilderness Society, about 1 million seabirds, 1,000 sea turtles, and 5,000 marine mammals died.
7. Drilling for fossil fuels also affects humans. Fossil fuel chemicals cause **air pollution** which can lead to several respiratory diseases. Also, fossil fuel chemicals can leak toxic substances into drinking sources as well as soil.
8. According to the Center for Biological Diversity, in the United States we use 100 billion plastic bags per year which require 12 million barrels of oil to make!
9. It takes about 1,000 years for a plastic bag to break down. But once plastic breaks down, it unfortunately does not fully degrade. A plastic bag will become **microplastics** which if they end up in the ocean many sea animals end up consuming. The other negative effect of microplastics is that they are difficult to get rid of since they are so small and spread out over water easily.
10. Fossil fuel usage is connected to **climate change**. The reason is because fossil fuels release gasses that trap heat, known as **greenhouse gasses**, into the atmosphere. One of these gasses is carbon dioxide/C02.
11. The United States is one of the world's top emitters of greenhouse gasses. But this can change if we work to decrease our use of fossil fuels and dependence on plastic.

Sources:

[The Wilderness Society: 7 ways oil and gas drilling is bad for the environment]
[The Center for Biological Diversity : The Problem with Plastic Bags]

POST AUDIT ACTIVITY – TAKING ACTION

Congratulations on completing a Plastic Waste Audit at your school! Students who took part in the audit now have a better understanding of the amount of plastic waste that is created as a result of their school meals/snacks, and how it impacts their environment. Below is a list of advocacy ideas to continue your plastic waste conversation and drive it towards taking action.

VOCABULARY

Advocate: someone who stands up for themselves and for other people, or for things they care about. An advocate can be a person with a new idea OR someone who supports someone else's idea.

Activism: is an act that inspires environmental, social, economic or political change.

ACTIONS

There are many ways to start a student-led campaign about plastics, waste awareness, or the 3 R's and beyond (Refuse, Repair, Reduce, Reuse, Recycle…).

Hands on

- Make daily announcements related to your campaign to the entire school using the PA system, broadcast to classrooms, send email blasts, write a newsletter article or whatever method your school uses to share information.
- Monitor classroom and/or cafeteria sorting stations to provide help and feedback on student sorting. See our Student Monitor Guide.
- Give short presentations to each class sharing the results of the audit and ways they can help reduce plastic use and how to properly sort plastics in the cafeteria.

Visual

- Host a virtual of in-person film screening for students, faculty, or parents to learn about plastic waste. See Microplastic Madness film included with packet.
- Create a student video encourage sorting of hard plastics in your school.
- Start a plastics reduction social media campaign that can be shared to your school community featuring easy ways to reduce plastic – bring a water bottle, use a reusable snack bag or reuse your plastic bags several times.
- Create a plastic waste art installation as an eye-catching display that makes people stop and think.
- Brainstorm an upcycling activity with plastic or other waste from your school and home and invite classes to participate in an upcycled art show.
- Create 3D posters with plastics from your school to spread awareness about plastic waste and where to put plastic items.

Written

- Write a letter to local council members, your school administration, or corporations regarding the plastic waste problem and how they should address it.
- Sign a petition like the World Wildlife Fund's 'Join the Fight Against Plastic Pollution'
- Write a petition to spread a message and promote your cause using our Advocacy Petition outline.
- Write a poem, song, or fictional story about plastic waste and its impact on the environment.

Community Based

- Organize a neighborhood clean up at a local space that is commonly covered in rubbish (ex. A road, beach, park).
- Host a plastic-free celebration to share your Plastic Waste Audit findings and educate on plastic waste's impact on the environment.
- Plan a virtual or in-person field trip to plastic related art exhibits, recycling facilities, or local zero waste stores.

Other

- What thoughts do you have about action you can take to increase awareness of plastic waste in your school?
- What actions can you encourage other students in your school to take that would reduce plastic use and make sure that plastic is placed in the correct bin?

POST AUDIT ACTIVITY – LEARN MORE

Rusty's Round the World Adventure: Plastics and the Ocean

Join Rusty as he travels the world's oceans to find out more about the life that lives there and the impact plastics are having on ocean wildlife. Students will perform a few simple experiments to examine whether trash can float, blow around, or wash away, drawing conclusions about how waste—primarily plastic—ends up in the ocean.

Access the Lesson here: bit.ly/RustyPlastics

Microplastic Madness

Sign up to host a FREE screening of Cafeteria Culture's award winning movie, **MICROPLASTIC MADNESS** (watch the trailer here). This uplifting, "take action" film features NYC public school students and has been screened in 42 countries, sparking local and global youth action to stop plastic pollution. Use the movie as a teaching tool to kick-start zero waste and climate discussions or to advance sustainability initiatives you already have in place. This film shows students actively problem-solving: specifically, collecting and analyzing data, designing and implementing solutions, and advocating for change.

All NYC schools can screen the movie for free from March 29th - April 29th. When you sign up, you'll also receive a link to the **Companion Guide** that enables teachers to show the movie either in one sitting or in segments. The discussion questions connect specific movie segments with Science, Social Studies, Media, ELA, and the Arts. **Sign up for a free screening here.**