Litter in the Niagara River Watershed: Data Collection, Analysis, and Interpretation

Adapted from the "Litter in the Tennessee" by the Cumberland River Compact.

Overview: We all know litter is bad, but how much litter is in our environment? Where does it come from? This lesson allows students to collect, analyze, and interpret data on litter in the Niagara River Watershed.

TEACHER INFO

Standards:

- MS-ESS3-3 – Earth and Human Activity - Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment.
- HS-ESS3-4 - Earth and Human Activity - Evaluate or refine a technological solution that reduces impacts of human activities on natural systems

Background information:

The definition of a *watershed* is an area of land where all streams, rivers, and stormwater drain into the same waterbody. This means that all the trash found on land, on roads or in parking lots can eventually make its way to our waterways when it rains. Litter flows from small streams and eventually flows into major waterways like Lake Erie or the Niagara River, which is a drinking source for millions of people – including Western New York! Individuals taking action to collect litter in different spaces can help our local waterways.

In this activity, students explore litter pollution through data graphing, analysis, and interpretation. Students collect their own litter, record the data and compare their data to previously collected data from a large cleanup event. For extra points, students can upload their data to the Ocean Conservancy's largest litter database in the world, TIDES (*Trash Information and Data for Education and Solutions*), which helps to support data driven solutions to prevent litter pollution.

Students will submit a graph and narrative interpretation of the data to assess their understanding.

Materials:

- A piece of litter or photo of litter
- Video: https://www.youtube.com/watch?v=lrRsQi9jQ38
- **TIDES** Global Litter Database: https://www.coastalcleanupdata.org/

Discussion Topics:

Show the students a piece of litter you found or the photo of litter. Ask them what words come to mind when they see it. Tell students you are not sure where this litter came from, but you found it near a local stream or river. Have students brainstorm ideas about how that piece of litter got there. All of the ideas brainstormed should be connected to humans. Additional question: Have students seen this type of litter anywhere else? Why would it be important to collect information on the types of litter we find?

Watch the video. This will help students understand how litter gets in our waterways through storm drains.

Explain the activity to the students. They will collect their own data through a cleanup and also compare their data to cleanup data from a Buffalo Niagara Waterkeeper cleanup event.

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STUDENT GUIDE

Objectives:

- Collect data on litter in your community through a **Solo Sweep**
- Analyze and graph litter data
- Interpret your data to understand how litter may impact water in the Niagara River Watershed
- Compare your data to cleanup data from a Buffalo Niagara Waterkeeper cleanup event and enter the data into the largest litter database in the world TIDES (*Trash Information and Data for Education and Solutions*)

Materials:

- Pencil
- Data collection paper
- Graph paper
- Gloves (for litter cleanup)
- Trash bag (for litter cleanup)

Background:

We have all seen litter or trash on the ground. Think of places where you often see litter. Litter can have negative impacts on the environment. During rain events, litter can also wash from the land into waterways directly, or through storm drains.

You can make a difference by cleaning up litter in your neighborhood, around your school, or other places you recreate. In these activities you will participate in a litter cleanup, collect data on the types of litter you find, and share the results using a graph. You will also compare your data to data from a Buffalo Niagara Waterkeeper cleanup event and have the opportunity to share your results on the Ocean Conservancy's global litter database, TIDES, (*Trash Information and Data for Education and Solutions*). After you analyze the data, you will create an interpretation, or explanation, of how the litter ended up on the group and what impact would it have had if it entered a local waterway.

Safety Note Wear gloves when picking up litter. Do not enter busy roadways to pick up litter. Stay on public property and do not work alone.

Before moving on to the lesson activity, please watch this video:
https://www.youtube.com/watch?v=lrRsQi9jQ38

Activity:

Litter Pickup/Solo Sweep

1. Review Safety Guidance: https://bnwaterkeeper.org/wp-content/uploads/2020/04/Cleanup-Safety-Infographic.png

2. Complete a litter pickup around your home, school or a public space in your local community. Spend at least 20 minutes picking up litter and complete the Data Sheet on the following page. (*20 points*).

3. Graph your results on the graph paper provided. Create a bar graph with how many items you found. (*10 points*) Litter type and number of items should be used on the x and y axis. Which one goes where? Be sure to label your axes! (*2 points*)

4. Create an account on the Ocean Conservancy's largest litter database in the world, TIDES, (*Trash Information and Data for Education and Solutions*). Click on "Enter Data," in the top right-hand corner which will bring you to the world map. In the search bar, enter the street or location name where you completed the litter pick up. Click on the exact location on the map and a red pin will appear. Next click the blue button underneath the app that says "Enter Data." Then enter number of each item you found into the database and click "Submit and Finish" once you added all of your data! (5 *bonus points*)

Litter Collection Data Sheet:

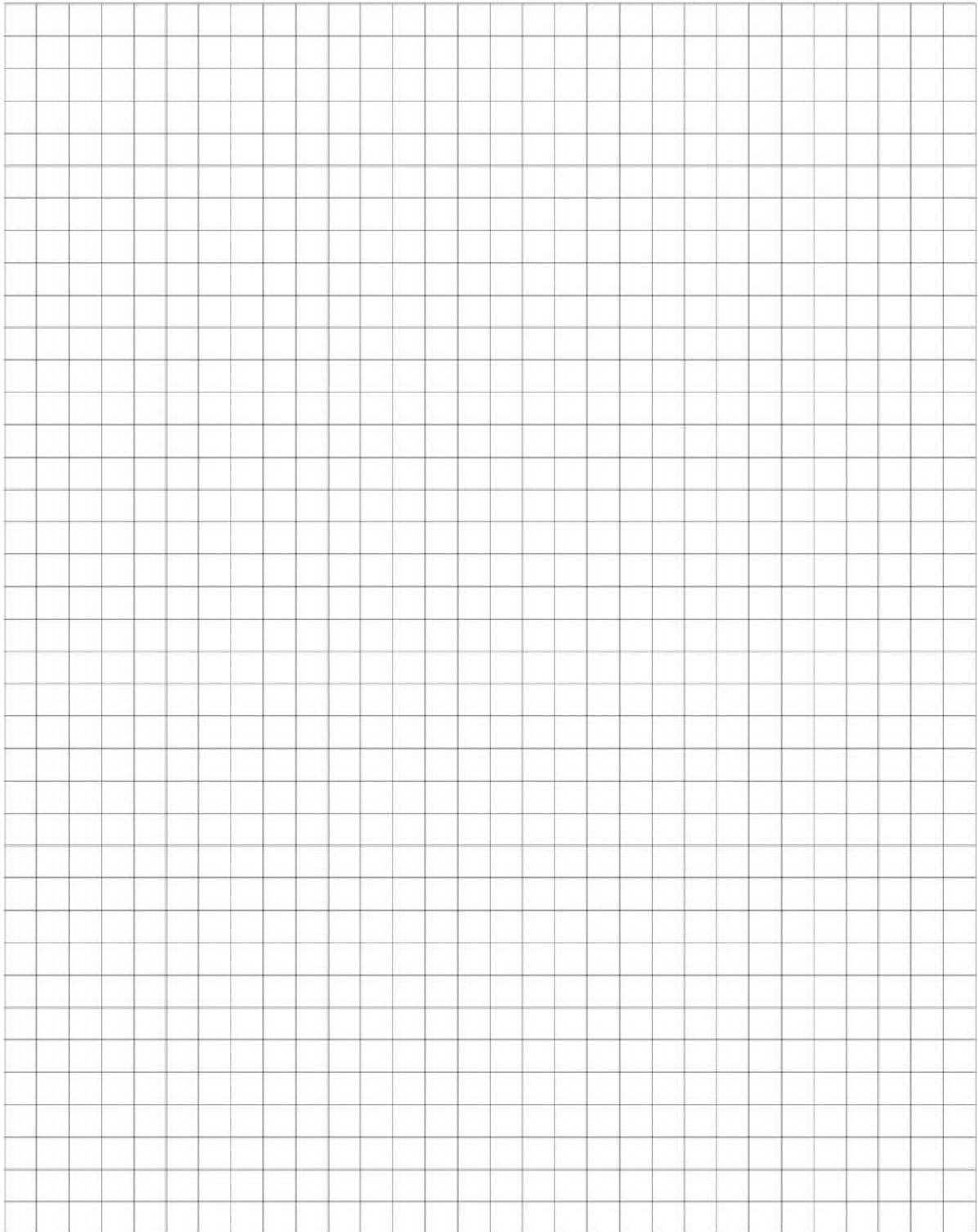Count how many of each item you find to make a graph.

_____Plastic Bag

_____Drink Can

_____Plastic Bottle

_____Glass Bottle

_____Snack Wrapper

_____Plastic Fork, Knife, or Spoon

_____Fast Food Wrapper or Bag

_____Cigarette Butt or Cigar Plastic Tip

_____Plastic Straw

_____Styrofoam Piece

_____Small Plastic Piece

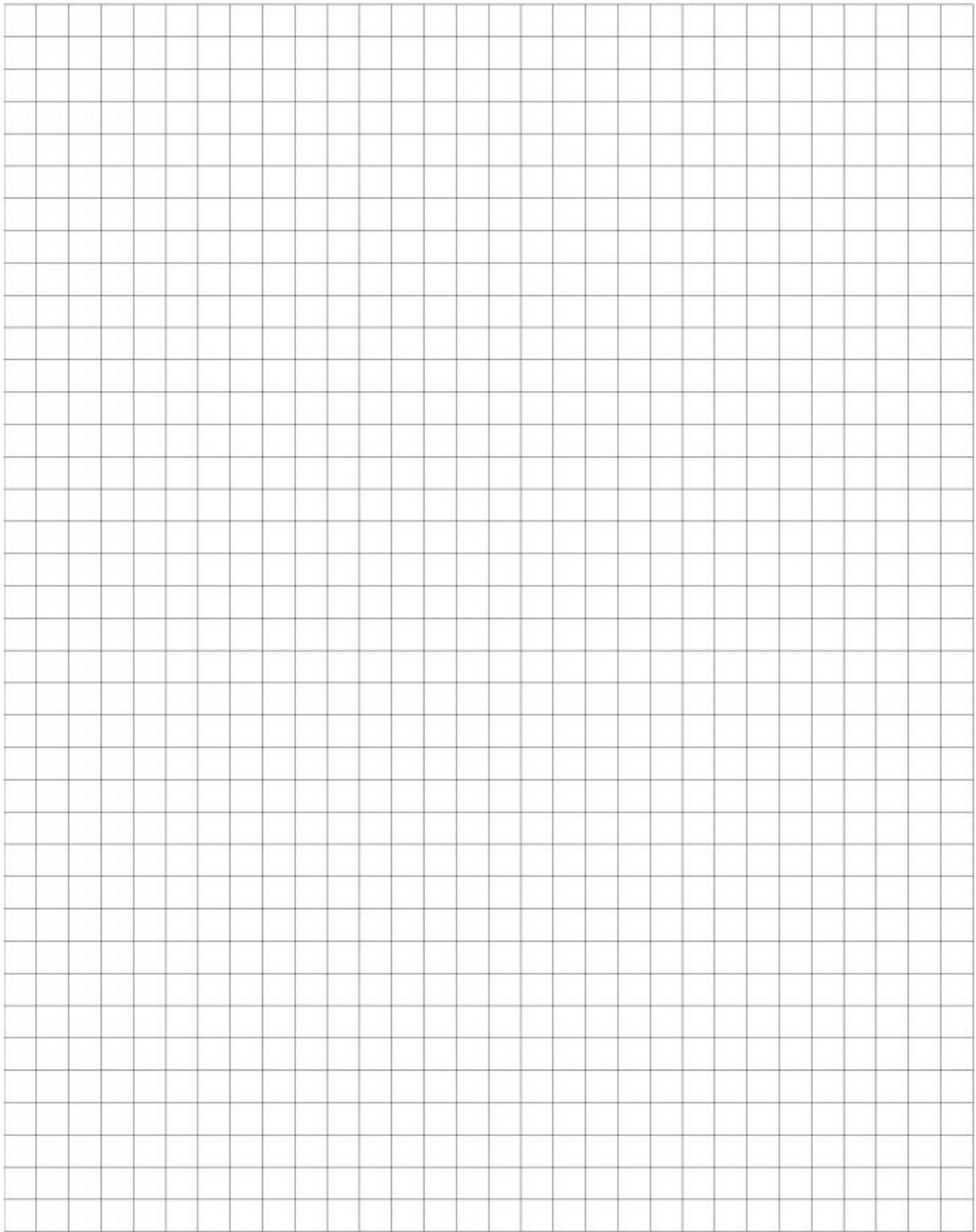*If you find something not listed above, create your own category below.*

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What was the strangest item you found? _____

What area did you clean up? _____

Were you surprised by what you found? Why or why not?

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5. Write a paragraph explaining what you found. Include how you think the litter ended up where it did. Include your thoughts on how the litter would impact on a local waterway if it made it that far. Refer to your data and observations for this explanation. (*10 points)*

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6. Look at data collected from a Buffalo Niagara Waterkeeper Cleanup event here: https://bit.ly/2UEgzEB Graph this data in the same way you graphed your own cleanup data on the following page. Compare to your cleanup data. What is similar? What is different? How many people do you think participated in this cleanup event? What does the data tell you about the site of the cleanup event and how could it be helpful to have this data? (*10 points*)

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7. Read the following excerpt from a Greenpeace Article
   (https://www.greenpeace.org/international/story/21792/plastic-waste-environmental-justice/)

Corporations Profit from Plastics

Corporations like Nestlé (world's largest food & beverage company) and Unilever (British multinational consumer goods company) profit wildly from single-use plastic packaging, while peddling the myth of recycling as a solution. But anyone who has thought seriously about the issue can see that recycling could never handle the amount of plastic surrounding our everyday life.

Also, don't forget that plastic is itself created from fossil fuels and lobbied for by the fossil fuel industry, while they desperately try to maintain the single-use plastic status quo instead of tackling the problem at source. Only by stopping the production of single-use plastics can this crisis be addressed. But these companies try to keep you in the dark by claiming recycling can solve the plastic pollution crisis to ensure their profit at the expense of people right now, today.

Answer the following questions:

Who will ultimate pay for the damaging effects of plastic production? Do your parents and school pay for the cost of hauling their trash to the dump? Who do you think pays to maintain the dump in perpetuity? (*10 points*)

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