

DUML MARINE DEBRIS CURRICULUM

COMMUNITY SCIENCE FOR 4TH/5TH GRADE



WELCOME!

Thank you teachers for all the hard work you do day-in and day-out inspiring our kids. Our hope is that this Marine Debris Curriculum will provide you with hands-on and meaningful activities that get your students out into nature, give your students opportunities to make positive change in their communities, and foster your student's sense of environmental stewardship for their community.

This is the third version of the Duke University Marine Lab Marine Debris Curriculum; and the changes in this version resulted from suggestions from teachers, new science conducted by marine debris researchers, as well as community organizations working to make sure our waterways are clean. We could not have done this alone, so thank you to everyone who has made this Curriculum better. A special thanks goes out to Jenna Hartley -- a PhD student in the Stevenson lab at North Carolina State University. Jenna has been using the Marine Debris Curriculum to conduct environmental education research on intergenerational learning. Her environmental education research, observations, passion for teaching, and commitment to making the world a better place, have improved this Curriculum (and associated teacher trainings) in ways too numerous to count -- thank you Jenna!

Lastly, thank you to all of the past and present teachers for sharing the achievements of your students with us, we continue to be inspired by your students, their creativity, and their passion for making the world a better place... one cleaned waterway at a time!

Regards,

Liz DeMattia

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the ENVIRONMENT
Duke University Marine Lab



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INTRODUCTION

Our oceans, beaches and coastal waterways are full of many land-based items that do not naturally belong there. Plastics, metals, rubber, fabrics, abandoned boats, derelict fishing gear and more make their way into our waterways; and have created an enormous pollution problem called marine debris. According to NOAA, marine debris is defined “as any persistent solid material that is manufactured or processed and directly or indirectly, intentionally or unintentionally, disposed of or abandoned into the marine environment or the Great Lakes.” Marine debris affects waterways and oceans throughout the world, and much of the problem stems from what is produced on land, used on land, and disposed of in a manner that makes its way into waterways. In Eastern North Carolina’s 3,000 plus miles of coastline, the issue of marine debris is especially poignant because marine debris negatively affects the health of our marine environment. And activities that depend on healthy waterways generate over 2 billion dollars of GDP ocean economy for NC ¹.

This Marine Debris Curriculum combines community science at the Duke University Marine Laboratory (DUML) Community Science Initiative with environmental literacy activities to connect elementary students to marine debris issues, research, and researchers in our community. The interdisciplinary activities in this curriculum are designed to inspire our kids to explore and discover issues surrounding marine debris and utilize a mixture of newly created activities, existing research protocols, and education resources (from places like Washed Ashore, NOAA, and ScienceWorld) that have been modified for elementary education (grades four and five). Together, these activities represent a year-long curriculum that will engage elementary students with experiential learning based on local ecosystems. We hope DUML’s Community Science Initiative’s Marine Debris Curriculum integrates into existing classroom activities, and provides teachers with hands-on exploration activities that complement existing curriculum.

As teachers, you know your class and students best. Please feel free to deliver the activities in a time frame that works best for your classroom flow. Topics and activities can be focused over a few weeks, spread out over a month, or peppered throughout the school year. Many of the activities have extension options that can allow you to expand your exploration in ways that work best for your students/classroom. In addition, we also provide classroom examples from teachers currently using the Marine Debris Curriculum to highlight ways in which teachers have used or modified an activity for their classrooms. Finally, links to 4th grade common core standards in Math, Science, ELA, Art, Technology, Social Studies, and Civics & Government are located in the appendix.

¹North Carolina’s Ocean Economy: A First Assessment and Transitioning to a Blue Economy https://ncseagrant.ncsu.edu/ncseagrant_docs/products/2010s/NC_Ocean_Economy_White_Paper.pdf

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MODULE 1: CLASSROOM EXPLORATIONS

These science and technology activities are used to introduce and provide background information in your classroom on waste, plastic, and robotics (science, math and technology). These background topics set the stage for the field research and creative engagement components.

2

MODULE 2: FIELD RESEARCH

These science, math, and technology research activities are based on a waterway clean-up to collect, quantify and measure marine debris in our waterways.

3

MODULE 3: CREATIVE ENGAGEMENT

These exploration activities work well with small groups, and allow students to further explore the topic of marine debris creatively with art, poetry, writing, research, civics, and technology. These activities are designed so that the products (art, poems, stories, and videos) can be shared with the general public and give students a sense of civic engagement within their community.

4

MODULE 4: TEACHERS INVOLVE PARENTS IN SCHOOLWORK (TIPS)

These are interactive homework assignments that allow students to share their work with family members.

5

MODULE 5: DOCUMENTATION

This is an on-going class activity where students use photos and videos of their activities to create a documentary of what they did and what they learned.

MARINE DEBRIS PROGRAM



Classroom Explorations

Field Research

Creative Engagement

Parental Involvement

Documentation

Exercises

Waste & Plastics

- Waste Audit
- How Long Till It's Gone?
- What is Plastic?
- A Plastic Ocean

STEM

- Physics of Marine Debris Movement
- Marine Debris Entanglement
- Majestic Plastic Bag

Waterway Clean-up

- Collect & Quantify Marine Debris
- Data Analysis & Quantification

Community Art

- Marine Debris Mosaic
- Marine Debris Poetry
- Circle of Viewpoints
- Journey of X Mural
- PSAs

Civic Engagement & Communication

- Public Presentation of Art & Civic Action

TIPS #1:

- Interactive homework on marine debris

TIPS #2:

- Interactive homework on creative engagement

Along the Way

- Student-led documentation of the program with videos, photos and commentary
- Creation of student documentaries



GLOSSARY

| | |
|------------------------------|--|
| Biodegrade | To slowly destroy and break down into very small parts by natural processes, bacteria, etc. |
| Classification Error | Errors made while deciding how to categorize marine debris (e.g. classifying glass as plastic debris on the marine debris data sheet). |
| Compost | Organic matter broken down into fertilizer/soil. |
| Corrode | To wear away by degrees in a gradual fashion -- usually by chemical action. |
| Currents | A body of water or air moving in a definite direction, especially through a surrounding body of water or air in which there is less movement. |
| Derelict Fishing Gear | Nets, lines, crab/shrimp pots, and other recreational or commercial fishing equipment that has been lost, abandoned, or discarded in the marine environment (NOAA definition). |
| Marine Debris | Any persistent solid material that is manufactured or processed and directly or indirectly, intentionally or unintentionally, disposed of or abandoned into the marine environment or the Great Lakes (NOAA definition). |
| Microplastics | A very small fragment or piece of plastic. Specifically: a piece of plastic that is five millimeters or smaller in size. |
| Mockumentary | A motion picture or television program that pokes fun of a serious topic in a documentary format in order to make people think differently about a topic. |
| Photodegrade | To chemically degrade by the action of light. |

| | |
|------------------------------------|---|
| Plastic Pollution | The accumulation of plastic objects and particles (e.g. plastic bottles, bags and microbeads) in the Earth's environment that adversely affects wildlife, wildlife habitat, and humans. |
| Public Service Announcement | A commercial or advertisement that is broadcast to help the public. |
| Quantify | To determine, express, or measure the quantity of. For marine debris, quantify means recording the number and types of debris collected during the waterway clean up |
| Recording Error | Errors made while writing down data (e.g. accidentally counting 5 cigarette filters instead of 9 on the marine debris data sheet) |
| Recycling | Used materials that are reprocessed into other materials. |
| Stewardship | The job of supervising or taking care of something. |
| Waste | Garbage sent to a landfill. |



MODULE 1

CLASSROOM EXPLORATIONS

EXERCISES

- WASTE & PLASTICS 1.1
 - Waste Audit
 - How Long till it's Gone?
 - What is Plastic?
 - A Plastic Ocean
- STEM 1.2
 - Physics of Marine Debris Movement
 - Marine Debris Entanglement
 - Majestic Plastic Bag

CLASSROOM EXPLORATIONS

The **Classroom Explorations** activities are designed to introduce topics and provide the background information so that your students are prepared for the marine debris field research component (beach or waterway cleanup). There are two sections in Classroom Explorations: i) Waste and Plastics and ii) STEM. Students will learn about marine debris, scientific sampling, and plastic pollution. The background activities can be spread out over weeks or consolidated for intense study.

WASTE & PLASTICS 1.1

This classroom explorations section is designed to give your students background knowledge on the types of garbage that becomes marine debris. Activities have been designed to allow your students to analyze different streams of waste, understand what plastics are made of, and evaluate the life cycle of plastics.

STEM 1.2

This classroom explorations section is designed to give students background knowledge on the physics of how garbage moves over land and into our waterways, and how aerial photographs from drones can be used in scientific sampling to monitor changes over time.

ACTIVITIES

Waste & Plastics

- Waste Audit
- How Long till it's Gone?
- What is Plastic?
- A Plastic Ocean

STEM

- Physics of Marine Debris Movement
- Marine Debris Entanglement
- Majestic Plastic Bag

NOTES

WASTE AUDIT (ACTIVITY)

INTRODUCTION

This activity will introduce students to the waste/garbage issue by connecting it to their personal behavior and allowing students to extrapolate up from their personal behavior to that of their school, community, county and state.

OBJECTIVES

At the end of this activity students will be able to:

- Understand the scale of garbage generation on a personal level.
- Analyze personal garbage audits and scale up to create estimates for garbage generation in schools, communities, counties and state.
- Understand that marine debris starts as a garbage issue on land.

NOTES

MATERIALS

- A scale to measure garbage weight
- Clear containers to keep garbage, recycling and compost. Students can keep tallies of individual pieces of trash and recycling, or just get weights before putting in the bins [hint: empty compost bin daily].
- A bucket of soapy water and vinegar spray to clean and disinfect plastic.
- A copy of garbage audit worksheets for students (pg. 24).
- Long paper for murals, hot glue gun, markers and paint materials.
- TIPS Assignment Worksheet #1 (pg.27).

WASTE AUDIT (ACTIVITY)

ACTIVITY PLAN

1. Create a class definition of waste such that the definition incorporates waste (garbage we send to landfill), recycling (used materials that are reprocessed into other materials), and compost (organic matter broken down into fertilizer/soil).
2. Conduct an audit for one week of all waste generated by each individual in the class. Create three bins (waste, recycling, and compost) in your classroom, and give each student a tally sheet to write down the quantity of each item they put in each bin. Note: classrooms can also create clear garbage bins on each desk (that are emptied daily) as a way for students to visually compare individual waste generation.
3. Analyze the results from your audit and evaluate how much waste each student and class generates (use the garbage audit worksheets included or create your own).
4. Calculate the average amount of garbage, recycling, and compost generated per student (per class, per school, per day and per year); and calculate diversion rates (equation is on garbage audit worksheets). Extrapolate to create averages for schools in the county and state.
5. Use the plastics collected during the waste audit and data from the math activities and create a mural explaining how much plastic your class uses.
6. Send home TIPS #1 assignment (pg. 49)

EXTENSIONS

- Build composting/vermicomposting stations at your school (many examples online).
- Compare classroom composting among different classes (have competitions for recycling and composting).
- Create Public Service Announcement graphs of the waste audit and present to younger classes in the school.
- Check out NOAA's Trash Talk videos for lots of background
info: <https://marinedebris.noaa.gov/discover-issue/trash-talk>
- Check out Washed Ashore's *Resourcefulness in a Bottle* and *Divide and Conquer* art activities for ideas on how to use plastics and trash as art materials (www.washedashore.org).

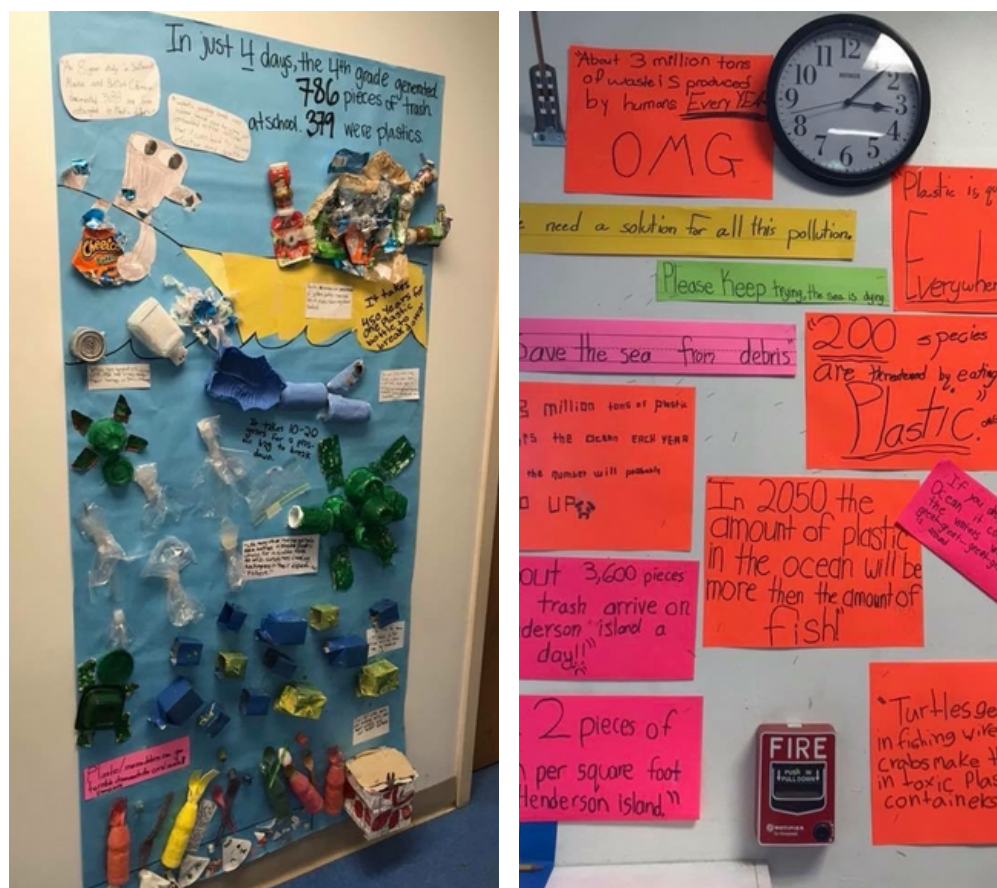


ACTIVITY: WASTE AUDIT

EXAMPLE IN THE CLASSROOM

Cristina Quattrone's fourth grade classes have been doing the Waste Audit activity as preparation for their beach cleanup. Cristina feels that this activity allows her students to make connections between marine debris and their daily habits, and also see how small amounts of trash accumulate over time. Cristina has made this activity work in her classroom by having her students read several nonfiction articles about the plastic problem (on NewsELA), and writing out interesting facts/quotes from their research.

She then has her students record and clean the trash generated in her class for one week. After one week, the class brainstorms together and uses the trash to create an informational mural for their school -- complete with quotes from their nonfiction articles. After the mural students take the TIPS assignment home to conduct a waste audit with their families. While the mural portion is time consuming, Cristina feels that this activity is important because "it makes an abstract concept relatable, and also invests students in being part of the solution. It is also a great way for students to apply math skills to understand exactly how this is much bigger than one person's habits."



Examples of the informational mural and the wall of quotes from the student research.

HOW LONG TILL IT'S GONE (ACTIVITY)

INTRODUCTION

This activity was created by Washed Ashore (www.washedashore.org) and the full lesson plan can be found online. This activity has students playing a game to estimate the time it takes objects from daily life to break up or break down.

OBJECTIVES

In this activity students will be able to:

- Provide examples of man-made materials that will last many decades.
- Define the terms Biodegrade, Corrode, and Photodegrade (definitions from Merriam-Webster dictionary).
 - Biodegrade: "To slowly destroy and break down into very small parts by natural processes, bacteria, etc."
 - Corrode: "To eat away by degrees as if by gnawing; especially: to wear away gradually usually by chemical action."
 - Photodegrade: "To chemically degrade by the action of light."
- Describe why different materials will take more or less time to degrade based on the environment they are in.
 - Definition of environment: "The circumstances, objects, or conditions by which one is surrounded."

ACTIVITY PLAN

- This activity takes ~30-40 minutes

NOTES

MATERIALS

- Washed Ashore Lesson Plan with background materials.
- Set of cards and NOAA "How Long Till It's Gone?" poster. The DUML website has links to a set of cards you can download and print, or you can create your own with notecards.

EXAMPLE IN THE CLASSROOM

Marti Sullivan (whole class enrichment specialist for 4th and 5th grade) uses the How Long Till It's Gone and the Create a Polymer activities from Washed Ashore as a way to explore and further provide background on the types of materials students will find on their waterway cleanup. She starts with How Long Till It's Gone and then uses the Create a Polymer activity to explore the scientific method and understand the different properties of plastics. While this is a messy activity, students enjoy being able to create a substance and experiment in a non-prescriptive fashion.



Small groups of students sorting cards from the *How Long Till It's Gone* card game

WHAT IS PLASTIC? (DISCUSSION)

INTRODUCTION

This discussion was created by Washed Ashore (www.washedashore.org) and the full lesson plan can be found online. This discussion helps students understand man-made polymers -- why they were created, how they are used, and what they are recycled into. This really helps students understand that plastics do not biodegrade and break down, but break up into smaller plastics, i.e., microplastics. This helps students understand what microplastics are, and where they come from. We suggest pairing this discussion with the *How Long Till It's Gone* activity.

OBJECTIVES

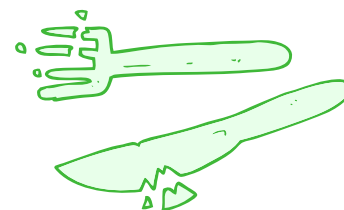
After this discussion, students will be able to:

- Describe basic polymer structure and characteristics.
- Describe the characteristics that make different types of plastic unique.
- Define microplastics:
 - Microplastics: "a very small fragment or piece of plastic. Specifically, a piece of plastic that is five millimeters or smaller in size" (Merriam-Webster).

ACTIVITY PLAN

- This discussion takes ~10-20 minutes, and is easily tacked on to the *How Long Till It's Gone* activity.

NOTES



MATERIALS

- Washed Ashore Lesson Plan with background materials.
- Printed chart of household plastics.

A PLASTIC OCEAN (FILM)

INTRODUCTION

A Plastic Ocean is a documentary that follows the journey of explorers, scientists, engineers, and conservationists as they travel to remote parts of the world; documenting the environmental issues associated with plastic pollution and its impact on the environment, ecosystems and human health. You can buy or rent the 104 min film online at plasticoceans.org or Netflix.

NOTES



PHYSICS OF MARINE DEBRIS (ACTIVITY)

INTRODUCTION

Not all marine debris is left on the beach or thrown overboard by boaters. Some of it is dropped on land or escapes from trash cans on windy days and ends up on the beach or in the ocean. The forces of physics that drive the movement of airplanes and drones through the air are the same forces that move marine debris through the environment. In this activity, students explore the aerodynamic and hydrodynamic properties of types of trash that are common in the marine environment.

OBJECTIVES

- Apply concepts of aerodynamics to make inferences about the movement of different types of marine debris through the environment.
- Explain the characteristics that allow certain types of trash to move more easily through the air or water.
- Brainstorm ideas about how a piece of trash that wasn't left behind by someone at the beach could end up on the beach. Note: This brainstorming exercise is a good preliminary exercise for the Journey of X activity found in the Creative Engagement section.

NOTES

MATERIALS

- Various types of trash (e.g. plastic bottles, glass bottles, empty soda cans, plastic bags, paper bags, pieces of string, straws, food wrappers, bottle caps, etc.)
- Pencil and Paper
- Optional: Fan, bucket of water

PHYSICS OF MARINE DEBRIS (ACTIVITY)

ACTIVITY PLAN

- Give each pair or group of students a different piece of trash from the materials list.
- Have each pair/group make a list of adjectives describing their item. Have each pair/group identify features of their item that would make it move easily through air, on the ground, or in water. For example, a plastic bag is light and has a large surface area, so it will move easily through the air on a windy day. A glass bottle is smooth and round, so it would roll across a hard surface like pavement. A plastic bottle is hollow and floats on the water, so it could travel far across the ocean. A cigarette filter is small and so can get swept up in rain water and flow out into waterways via a storm drain.
- Optional: Use a fan and a bucket of water to test predictions about the objects.
- Have each student tell the other members of their group a short story about how their piece of trash could end up on the beach, even if it wasn't left behind by someone at the beach.

EXTENSIONS

- Have students explore ocean surface currents caused by wind on <https://www.windy.com> and make predictions about where marine debris will concentrate on an ocean-basin scale. While exploring these currents, students should think about what types of trash are most likely to be transported based on the findings from the Physics of Marine Debris activity. Students can check out maps to see areas where marine debris generally accumulates at the center of ocean gyres and learn more facts about plastics in the ocean: <http://www.thelivingsea.com/journal/wp-content/uploads/2012/08/five-ocean-gyres-trash1.jpg>
- What is Marine Debris? | A Cartoon Crash Course
 - <https://www.youtube.com/watch?v=fGQOkERpUhU>



MARINE DEBRIS ENTANGLEMENT (ACTIVITY)

INTRODUCTION

Drones can provide high-resolution aerial imagery of areas and/or animals that scientists are interested in studying. In this activity, students will use North Atlantic Right Whale (*Eubalaeana glacialis*) imagery collected by drones to estimate the effects of derelict fishing gear on marine mammal body size. Marine mammal scientists at Duke University photographed the body of a Right Whale individual, and one year later pictures from drone imagery found the same individual entangled in derelict fishing gear. Using these drone photographs students will determine any change in body size over time for the Right Whale.

NOTES

OBJECTIVES

- Analyze aerial pictures and determine the change in body size for an individual Right Whale.
- Understand the benefits and limitations of using aerial images for field studies.



MATERIALS

- Marine Debris Entanglement Worksheet (pg 47).
- Pencil, pen, dry-erase marker, or counters.

ACTIVITY PLAN

- Using the provided Right Whale worksheet, students will:
 - Estimate the area of each of the two Right Whale photographs.
 - Estimate the change in body mass after entanglement.

MARINE DEBRIS ENTANGLEMENT (ACTIVITY)

EXTENSIONS

- Understanding drag and how it affects speed of movement: *Running is a Drag* (<https://www.scienceworld.ca/resources/activities/running-drag>). This activity is a running game that can simulate how entanglement can affect the swimming of marine mammals. Students do relay races with umbrellas that create drag.

ACTIVITY: MARINE DEBRIS ENTANGLEMENT

EXAMPLE IN THE CLASSROOM

The Community Science team at the Duke Marine Lab uses the It's a Drag relay race and entanglement activity as background information before students go out in nature to clean local beaches. We start with 10 minutes of running and exploring drag by using umbrellas and/or having students run with a friend holding onto their shirt. This gives students a physical way to personally experience drag and understand how hard it might be for whales to swim while entangled in derelict fishing gear. This also allows the class to discuss why a whale would lose body mass even though they can still feed -- it is so much harder to swim with drag that the whales expend more energy than they can gain through feeding. Students then go inside the classroom to complete the worksheet. The hardest part of this exercise is that students all come up with different body mass calculations and want a "correct answer." We use the range of answers to talk about observations and how different groups can tally in different ways, then we look at the body mass trends for all groups. When looking at the trends, the entangled whale has less body mass after entanglement.



MAJESTIC PLASTIC BAG (FILM)

INTRODUCTION

Majestic Plastic Bag is a 4 minute “mockumentary” that is narrated by Jeremy Irons and follows the journey of a plastic bag from a grocery store to the Pacific garbage patch. This shows how a plastic bag moves through air and water. In addition, this short film is an example of using comedy to tackle a difficult problem and can be used as an example for communication projects that students can undertake in the Creative Engagement section.



NOTES

MODULE 2

FIELD RESEARCH

EXERCISES

- WATERWAY CLEAN-UP 2.1
 - Collect & Quantify Marine Debris
 - Data Analysis & Quantification

FIELD RESEARCH

These **Field Research** activities are centered around a waterway cleanup, giving students hands-on experience collecting data in the field, analyzing results from the collected data, AND connecting students to their local environment. Specifically, students will collect and quantify trash in a local waterway, analyze their data, and compare their research results to global estimates.

ACTIVITIES

Waterway Clean-up

- Collect & Quantify Marine Debris
- Data Analysis & Quantification

NOTES



WATERWAY CLEANUP (FIELD ACTIVITY)

COLLECT AND QUANTIFY

NOTES

INTRODUCTION

This activity will introduce students to collecting data in the field, connect them with a local water ecosystem/cleanup organization, and help students understand the importance of stewardship for local habitats (~ 3 hours).

OBJECTIVES

At the end of this activity students will be able to:

- Understand how to collect field data.

MATERIALS

Students should come prepared to spend the day outside (e.g. students should wear shoes that can get wet, wear a sun hat, bring a reusable water bottle, wear sunscreen, and bring a jacket if the weather is cool). The following materials are needed:

- Downloaded ICC Marine Debris Data Sheets for each group of four (go to oceanconservancy.org).
- First Aid Kit.
- 15 Buckets for garbage (usually provided by waterway clean up organizations).
- 30 pairs of cotton gloves (usually provided by waterway clean up organizations).
- Scale for the weighing station
- Dish soap, vinegar, and scrub brushes for cleaning "art trash."

The following items are not necessary, but are helpful:

- Clipboards (for each group of four) with pencils attached.

WATERWAY CLEANUP (FIELD ACTIVITY)

ACTIVITY PLAN

1. *Beforehand:* connect with a local cleanup organization. There are many groups (e.g. Streamkeepers, State Parks, County Parks) that are happy to have a group do a trash clean up in their waterway. The benefit of pairing with a local organization is that most of the cleanup organizations know which areas need to be cleaned, have cleanup supplies, and have staff/rangers that can share some local ecology of the area.
2. Review safety and data collection with students:
 - a. How to safely collect trash: wear gloves, leave sealed cans/bottles alone, how to collect a sharp object (including needles and broken glass).
 - b. How to fill out the Ocean Conservancy's International Coastal Cleanup data sheets: Make sure that each piece of garbage gets recorded with tally marks and describe the general headings.
3. Teachers should divide their class into groups of three or four. Groups should clean their designated waterways, and return to their meeting place with their trash.
4. After each group returns to their meeting place, students will weigh/record their trash, sort trash for "art trash", clean and disinfect "art trash", and enter their data on class ICC data sheets.

NOTES



WATERWAY CLEANUP (FIELD ACTIVITY)

DATA ANALYSIS

INTRODUCTION

This activity will introduce students to analyzing data from previous marine debris cleanups, and give them an understanding of the importance in data quality (~ 1 hour).

OBJECTIVES

At the end of this activity students will be able to:

- Create a graph of their marine debris and compare and contrast it to ICC data from previous years.
- Understand sources of error in the data (such as: recording errors, classification errors, heading errors, etc.).
- Develop hypotheses for why certain types of garbage are more/less prevalent in NC waterways in comparison to the ICC global data.
- Understand and recognize the effects of marine debris on local wildlife.

MATERIALS

- Graph paper, colored pencils, pens.
- Prepared table on white board (or on a projected worksheet) with the categories of marine debris at the top and sections to add all the tallies from each group.
- Downloaded ICC data (<https://oceanconservancy.org/trash-free-seas/international-coastal-cleanup/annual-data-release/>) to compare and contrast the class data with global results (this can be printed out from the ICC website or projected for the whole class).

WATERWAY CLEANUP (FIELD ACTIVITY)

ACTIVITY PLAN

This activity can be completed back in the classroom at your school (or at the field cleanup if there is a classroom). Preparation (10 min):

- Prepare a table for the students to fill out (with headings for the types of marine debris) on a white board (or projected from a computer spreadsheet). Student groups record their group totals for weight and totals for pieces of trash and determine the class totals. Students will use the class data for the graphing exercise.
- Have groups sit together with their data sheets, and have one person (from each group) report out totals for each heading. Discussion can occur during the reporting or at the end, but make sure to discuss: i) differences in tally numbers among the groups (and how sources of error can affect the data); ii) why certain types of marine debris are more prevalent; and iii) how different debris can potentially harm local wildlife.
- Have each group record the finalized class totals (numbers of marine debris per type and total weight) for their graphs.
- Each Group (or student) will create a hand drawn graph from their data that compares their data to ICC (graphs could illustrate: total number of garbage by topic, total number of pieces, total weight, amount of garbage per area, etc.). Have different groups create different graphs.
- Data Presentation: Each group will present their graph to the class and ask for feedback in making their data display even clearer. This feedback will help students create clear and coherent products for communicating to the public.

NOTES

MODULE 3

CREATIVE ENGAGEMENT

EXERCISES

- COMMUNITY ART 3.1
 - Marine Debris Mosaic
 - Marine Debris Poetry
 - Circle of Viewpoints
 - Journey of X Mural
 - PSAs
- CIVIC ENGAGEMENT & COMMUNICATION 3.2
 - Public Presentation of Art & Civic Action

CREATIVE ENGAGEMENT

These **Creative Engagement** activities are centered around using art and literature to present the marine debris issues to our community in a creative and informative manner. Students will creatively think about marine debris, design and build trash art, write poetry and stories, create a classroom mural, and develop public presentations for civic action.



ACTIVITIES

Community Art 3.1

- Marine Debris Mosaic
- Marine Debris Poetry
- Circle of Viewpoints
- Journey of X Mural
- PSAs

Civic Engagement and Communication 3.2

- Public Presentation of Art & Civic Action

NOTES

MARINE DEBRIS MOSAIC (ACTIVITY)

INTRODUCTION

This activity allows students to create an art mosaic using pieces of marine debris from their Waterway Clean-up. This activity is based on the *Culmination* activity created by Washed Ashore (www.washedashore.org). Remember, this activity uses colorful recyclable materials and garbage (cleaned) from the Waterway Clean-up for students to use in their class art -- so remember to save your "art trash!"

OBJECTIVES

At the end of this activity students will be able to:

- Assemble unrelated pieces of marine debris into mosaic materials.
- Design and create a mosaic for use in community engagement.
- Create a piece of art that illustrates the issue of marine debris and inspires community members to think about an issue affecting their community.

ACTIVITY PLAN

- This activity takes ~60-120 minutes, see Washed Ashore lesson plan for detailed activity plan. Note: this is a good activity to collaborate with the art teacher/department at your school.

NOTES



MATERIALS

- Cleaned marine debris from Waterway Clean-Up.
- Miscellaneous art supplies (such as: hot glue guns, paint, scissors, wire, etc.).

MARINE DEBRIS POETRY (ACTIVITY)

INTRODUCTION

This activity will allow students to add to their community art with poetry. Students will learn how to construct a Haiku, and then use the Haiku format to create poetry that helps communicate their feelings about the waterway clean up and the marine debris art. This activity can be introduced before the field research, and also repeated during the art making. By creating numerous Haikus, students will practice the poetry form and get a chance to think deeply about their environment and marine debris.

OBJECTIVES

At the end of this activity students will be able to:

- Interpret their art and science through poetry.
- Understand the structure of Haiku poems.
- Assemble words that generate feelings of marine debris into a Haiku.
- Read their Haiku aloud to their peers.

ACTIVITY PLAN

- Introduce Haikus (see worksheet pg. 52).
- Have kids go to a quiet spot and listen to the sounds of water and the outdoors, then think of nature-based Haikus.

NOTES

MATERIALS

- Sticky pads for Haikus.
- Haiku lesson plan handout (in appendix).



CIRCLE OF VIEWPOINTS & JOURNEY OF X MURAL (ACTIVITIES)

INTRODUCTION

These activities allow students to develop a new understanding of marine debris and use art and literature to explore the journey of marine debris from useful object to unwanted marine debris. Students will look at a piece of marine debris from the perspective of different users and then work in small groups to create a Journey of X story and drawing for a class mural. By thinking about different perspectives, students will gain an understanding about the complexity of marine debris and it will allow them to evaluate the issue with a greater sophistication.

OBJECTIVES

At the end of this activity students will be able to:

- Understand differing perspectives of marine debris.
- Write a creative story about the journey for their piece of marine debris.
- Illustrate their story with a drawing.
- Assemble the group stories and drawings into a class mural.
- Describe their mural to the public.

MATERIALS

- *Circle of Viewpoints* handout (one for each student) found on pg. 53.
- Interesting pieces of marine debris from your cleanup for the center of each circle.
- *Journey of X* worksheet (one for each student) found on pg. 54.
- Pens, markers, crayons, blank paper for illustrations, and big mural paper to combine the stories and illustrations from *Journey of X*.

EXAMPLE IN THE CLASSROOM

Wendy Horvat (grade five ELA teacher) uses the Journey of X activity after she has done a beach cleanup with her students. Back in her classroom, she allows each student to sort through the cleaned trash and find a piece that inspires them. She then encourages them to use their senses to explore the texture and strength of their piece of trash. Once they have explored their trash, Wendy uses the Empowering Writers program to guide the creation of the trash narrative. The students write about the journey of their particular piece of trash and the adventures it had along the way. She encourages them to culminate their stories with the trash being picked up by a student at a beach, sinking to the bottom of the sea, or staying afloat indefinitely. Wendy has found that students love the creativity of this activity, but can have a hard time with the writing process. Because of that, she has found that this activity is most successful when she introduces narrative writing with other topics earlier in the year before incorporating narrative writing with their marine debris stories. Below is a few paragraphs taken from the essay of a student in her class.

Journey Of a Mountain Dew Bottle

Hello, I am a bottle. More specifically, a Mountain Dew bottle. About three months ago I was sitting in a cooler at a gas station, waiting for a restock. Restocks don't come often, so I was very excited to see my new buddies. Moments later, a man in blue came in with a crate of familiar faces. When he got to my freezer, he put a bottle next to me and I was disgusted.

It was a bottle with the name of "Mountain Rush." It was one of those crappy off-brand drinks that is literally the same thing as Mountain Dew. I was furious. The man was putting so many Mountain Rush drinks in the same freezer I was in. I no longer felt like I belonged there. I should be somewhere like Wal-Mart or Food Lion. The man left the freezer open and with my impulsive attitude, I gave my body enough force and pushed a Mountain Rush bottle out of the freezer.

The bottle plummeted to the floor and exploded. I felt proud as I nudged back to my original spot. "Someone get the mop and clean that mess up" the cashier said as he slouched onto his chair. Soon an old woman with grey, silky hair came over and started to mop up the bottle's fluids. She picked up the bottle and threw it into the trash. All of a sudden, this hobo walked into the gas station.

PUBLIC SERVICE ANNOUNCEMENTS (ACTIVITY)

INTRODUCTION

A Public Service Announcement (PSA) is a commercial or advertisement that is broadcast to help the public. This activity will allow students to share a public service announcement about marine debris for their community. How and when classes share their PSAs can be part of the classroom discussion.

OBJECTIVES

At the end of this activity students will be able to:

- Develop talking points that aid in explaining the issues of marine debris to others.
- Describe and discuss the role of marine debris to their community.
- Create a script about marine debris.
- Use technology to create and film/record PSAs.
- Evaluate non-fiction for relevant and interesting facts.



MATERIALS

- Public Service Announcement Worksheet (pg 56).
- Computer loaded with the PSA example websites.
- Photo release forms for students in photos.

NOTES

PUBLIC SERVICE ANNOUNCEMENTS (ACTIVITY)

ACTIVITY PLAN

How can you make a PSA? When you make a PSA, remember it is a type of advertisement/commercial; and the best advertisements are ones that have a clear message and are fun to listen to and/or watch. They also are short in length 30–60 seconds! Here are four things to think about when you organize your PSA: know, feel, see, and do.

- What do we want the audience to KNOW?
- How do we want the audience to FEEL?
- What do we want the audience to SEE? (only if you are doing a video-- not relevant for just radio PSAs)
- And after listening/watching the PSA, what do we want the audience to DO?

STEP 1: Watch these PSA examples:

1. Kids Safety Internet - (:34)

<https://www.youtube.com/watch?v=PS-t78ZlexQ>

Strategy: Take a pledge.

How could you use that strategy with marine debris? _____

2. Child Passenger Safety: Bibbidi 30 (2005) Ad Council Radio (:30)

<https://www.youtube.com/watch?v=WKgUdll2L74>

Strategy: Repeat an action or phrase several times.

How could you use that strategy with marine debris? _____

3. Active For Life Public Service Announcement (:33)

<https://www.youtube.com/watch?v=2syJlbAM0vc>

Strategy: Use statistics and state a solution.

How could you use that strategy with marine debris? _____

4. Kids Ask the Candidates for President to Debate Science (:30)

<https://www.youtube.com/watch?v=yvTr9z9e3MA>

Strategy: Interview format.

How could you use that strategy with marine debris? _____

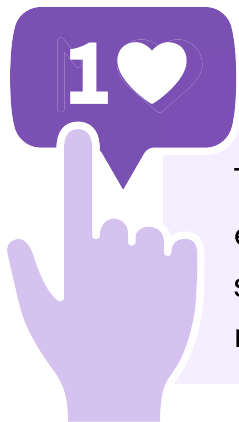
PUBLIC SERVICE ANNOUNCEMENTS (ACTIVITY)

STEP 2

Use the PSA worksheet to analyze the PSA examples and create a script.

TEACHER TIPS

1. *Have students read marine debris non-fiction and take notes before the PSA lesson.* While students read the non fiction articles, have them keep track of evidence and statistics that shock and surprise them. Then, the students will be even more prepared. Check out the non-fiction articles at the [DUML Community Science website under background resources.](#)
1. *Some helpful ideas for the PSA example (in case some students are stuck)*
 - a. Kids Safety Internet PSA.
 - i. Marine Debris ideas: Take the pledge for a cleaner beach...? Take the pledge to reduce plastic (could use the [9 tips to reduce plastic](#) as a starting point.
 - b. Child Passenger Safety: Bibbidi 30 Ad Council Radio.
 - i. Marine debris ideas: repeat an action or an idea over and over (i.e., drive home the “say no to straws” or something similar).
 - c. Active For Life Public Service Announcement.
 - i. Marine debris ideas: This could be easy to imitate with voices that just state stats and then state a simple solution; and use kids as graphs to represent amounts of plastic (like the circle graph in the beginning).
 - d. Kids Ask the Candidates for President to Debate Science.
 - i. Marine debris ideas: This could also be easy to imitate with kids asking pointed questions to the adults about their plastic consumption, recycling habits, etc.



SUPPLEMENTAL IDEAS

This activity is perfect for technology extensions. After creating a PSA script, students can use audio, video, or stop-motion animation to make their PSA unique.

EXAMPLE IN THE CLASSROOM

Marti Sullivan (whole class enrichment specialist for 4th and 5th grade) uses the PSAs as a culminating event to the unit. Marti finds that this activity was appealing to students for several reasons: students got to choose their PSA topics, they wrote their own scripts and created their own visuals, and they really enjoyed producing their videos and knowing that people would see them. The students were so excited that they shared their PSAs on a YouTube channel specifically for Marine Debris PSAs, and then sent the link to the PSAs to leaders in their community.

Janette Devan (5th grade science) used the PSA activity with her after-school drama club. This activity allowed her to incorporate science content with vocal production and performance elements. She prepped the activity with the workbook resources on PSA strategies, then brainstormed with her students on how they could use those strategies for marine debris. Her students wrote, performed, and filmed the script. And then each student decided what they would pledge. Students did the filming with an iPad, and used iMovie to edit the final product.



Asheville Recycling part 5
3 views • 4 months ago



Asheville Recycling part 2
5 views • 4 months ago



Asheville Recycling part 1
6 views • 4 months ago

Examples of student PSAs loaded onto the Marine Debris YouTube channel.

PUBLIC PRESENTATION OF ART & CIVIC ACTION (ACTIVITY)

INTRODUCTION

This activity will allow students to share their art (marine debris mosaics, poetry, literature, etc.) with their community. How and when classes share their art can be part of the classroom discussion. The goal of presenting art to the public is to illustrate how our students are public stewards and to help illustrate how marine debris is affecting our community.

OBJECTIVES

At the end of this activity students will be able to:

- Develop talking points that aid in explaining the issues of marine debris to others.
- Describe and discuss the role of marine debris to their community.

MATERIALS

- Marine Debris Mosaic Art.
- Marine Debris Haikus.
- Journey of X Class Mural.
- Public service announcement.
- Video documentary of the process (see Documentation pg 21).
- TIPS Assignment Worksheet #2.



Chihuly-inspired trash art from water bottles

EXAMPLE IN THE CLASSROOM

Cristina Quattrone worked with a local restaurant near her school to have a “Marine Debris night” where students presented their amazing marine debris sculpture and recited marine debris poetry and stories. Students invited their parents and other community members to the evening, and shared their knowledge of marine debris and their urgency for action -- in fact this event convinced the restaurant to be an ocean friendly establishment (no plastic straws or take out containers!). The hardest part of the public presentation was finding time and space near the end of the school year to schedule the event, as there are always competing events in the last months of school. The teachers used personal connections with local restaurants, and those personal connections helped them secure a location and date.



A student recites his poetry at a local establishment.



Marine debris art displayed at a local establishment.

MODULE 4

TEACHERS INVOLVE PARENTS IN SCHOOLWORK (TIPS)

EXERCISES

- TIPS #1
 - Interactive homework on marine debris
- TIPS #2
 - Interactive homework on creative engagement

TEACHERS INVOLVE PARENTS IN SCHOOLWORK (TIPS)

INTRODUCTION

The Teachers Involve Parents in Schoolwork (TIPS) assignments are interactive homework assignments that allow students to share their work with family members.

OBJECTIVES

At the end of these activities students will:

- Explain the issues of marine debris to their family.
- Connect the work they are doing at school to their home.

ACTIVITY PLAN

Go over the homework sheet in class, and have each student fill out the top section, with a due date. Remind students during class to return the TIPS Worksheets.

NOTES

MATERIALS

- TIPS Assignment Worksheet #1 (pg 49).
- TIPS Assignment Worksheet #2 (pg 51).



MODULE 5

DOCUMENTATION

EXERCISES

- Student-led documentation of the program with videos, photos and commentary.

DOCUMENTATION (ACTIVITIES)

INTRODUCTION

The Documentation activities are a way for students to document their learning process and create a video about what they learned. In addition, the videos are also a way for teachers to “see” the marine debris project and activities from their student's perspective, and offer an embedded form of assessment of the project.

NOTES

OBJECTIVES

At the end of this activity students will:

- Describe the activities that they completed.
- Discuss how the activities changed their perspectives on plastics, waste and marine debris.

MATERIALS

- A camera or video recorder. Cell phones, ipads and GoPro cameras all work well.
- A voice recorder. Cell phones and ipads work well (e.g., voice recorder).
- Photo release forms for students in photos.
- A movie/video app for students to create their own documentary (e.g., iMovie, Flipgrid, Greenscreen).

DOCUMENTATION (ACTIVITIES)

ACTIVITY PLAN

During each activity throughout the marine debris program, assign one student per group as “the reporter.” The reporter’s job is to take pictures and videos of the activity and their classmates, and then organize and store the photos on a class computer/drive.

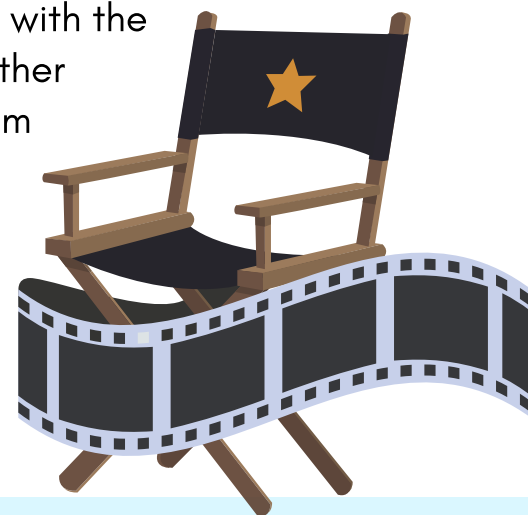
At the end of the program (i.e. after your class has completed all the activities), have students interview each other (either voice or video) and ask questions about the project. Possible questions include:

- Why did you compose your marine debris art the way you did?
- How did you decide on what materials to use?
- What did you want your marine debris piece of art to show?
- What do you think you have learned about marine debris after doing this program?
- Have you personally done anything differently in your life since you’ve been part of this program? Did your behavior change?
- Have you talked to anybody after you went through this program to tell them about what you’ve learned? Who did you talk to and what did you say?
- Do you think that kids can make a difference?
- Is there anything else you want to say?

Have students work in small groups (or as a class) and create a two-five minute documentary (per group) about their experience with the marine debris program. Encourage them to weave together pictures and videos, use music, quotes, and anything from their creative engagement activities!

SUPPLEMENTAL IDEAS

Make a list of words from the interviews and create a word cloud about the project.



WASTE & PLASTICS WORKSHEET

Student/group name: _____

Number of students in your group _____

| Category | Day 1 Weight | Day 2 Weight | Day 3 Weight | Day 4 Weight | Day 5 Weight | Total Weight |
|---|--------------|--------------|--------------|--------------|--------------|--------------|
| Recyclable containers (plastic, metal, glass...) | | | | | | |
| Recyclable paper (paper, cardboard, newsprint...) | | | | | | |
| Other recyclables (cartridges, batteries...) | | | | | | |
| Food wastes/ compost | | | | | | |
| Garbage | | | | | | |

Write out Calculation equations for:

1. Total Garbage per student at school [hint: calculate garbage per person and multiply by number of students and number of school days]

2. Calculate Amount Diverted from landfill via recycling and composting.

a. [total waste - (recycling + composting)]

b. Hint: diversion = total garbage - (recycling + composting)

MARINE DEBRIS ENTANGLEMENT WORKSHEET

Student/group name: _____

Date: _____

NORTH ATLANTIC RIGHT WHALE - CALCULATING BODY SIZE

In this activity, you will use two images of the same North Atlantic Right Whale (*Eubalaeana glacialis*) taken in February 2010 and December 2010, before and after the whale became entangled in a snow crab pot and 132 m of rope. With these images, you will be able to determine changes in the whale's body size before and after entanglement. Each square on the grid is 1 whale body unit long and 1 whale body unit wide.

You will estimate area by counting the number of whole and half boxes covered by the body.

AREA OF WHALE BODY = area of whole boxes + area of half boxes
Calculations needed for area of whale body

of whole boxes _____ x 1 = _____ (area of whole boxes)

of 1/2 boxes _____ x 0.5 = _____ (area of half boxes)

Estimate the area of the whale in February 2010 in whale body units², using the grid provided.

Estimate the area of the whale in December 2010 in whale body units², using the grid provided.

What is the difference of whale body size in December and February?

Why do you think there were changes in the area of the whale body?

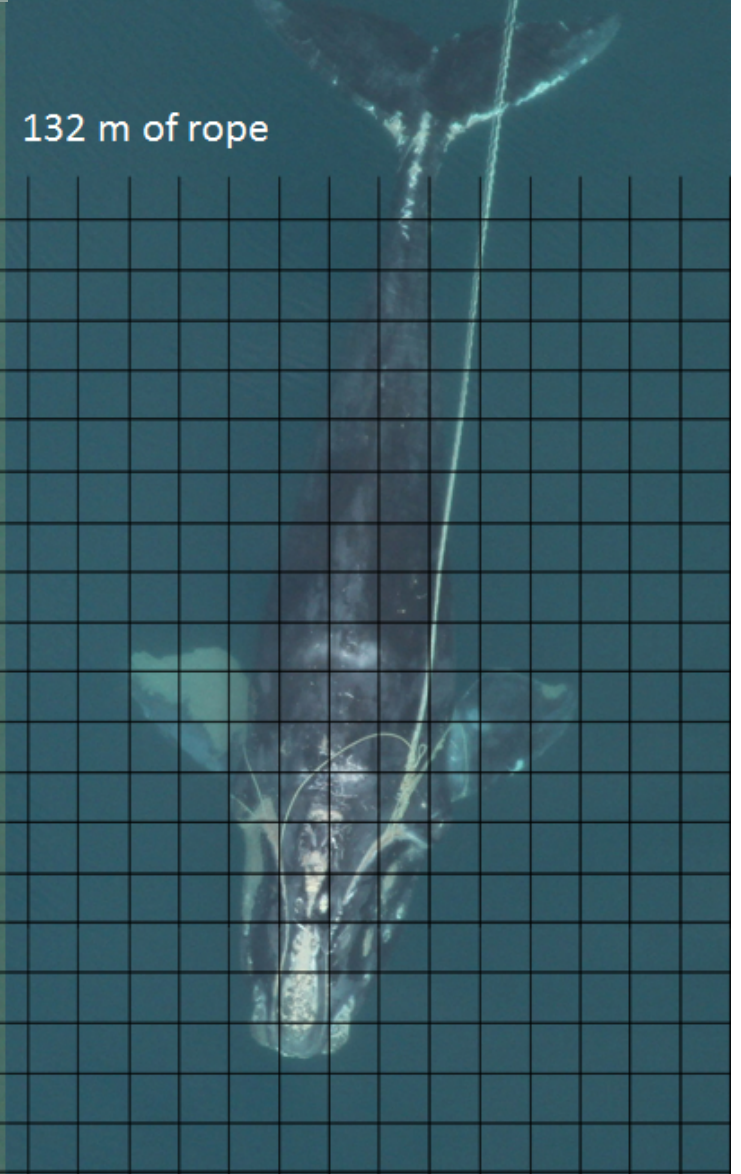
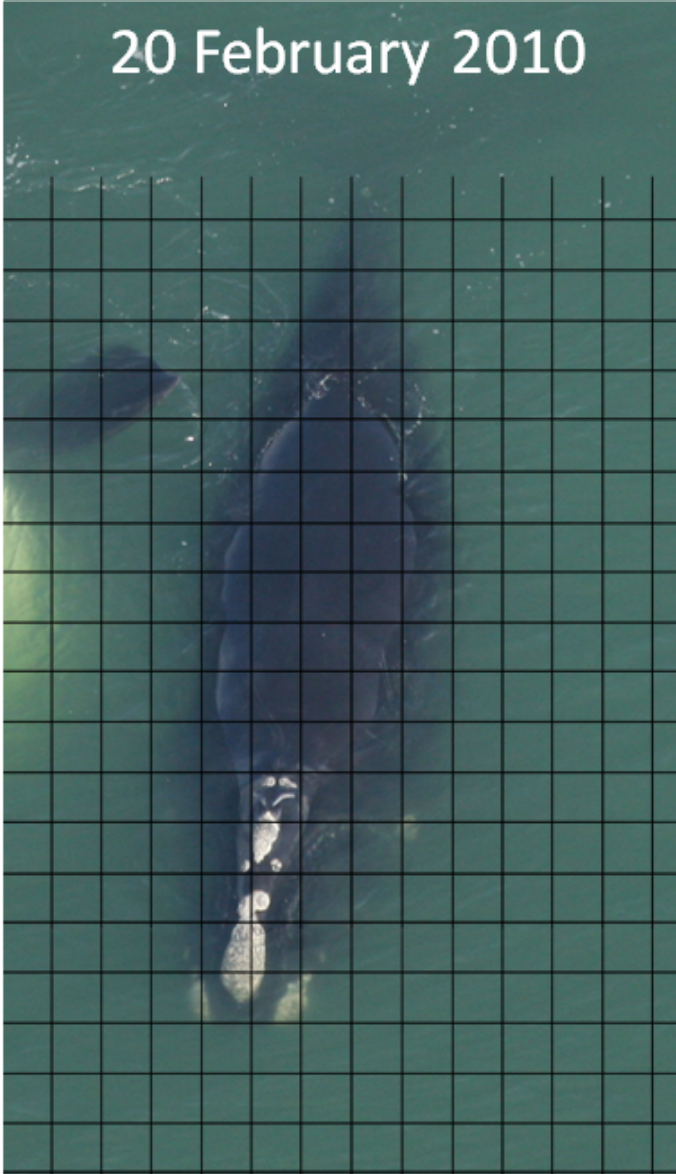
MARINE DEBRIS ENTANGLEMENT WORKSHEET

Photo Credit: Florida Fish and
Wildlife Conservation Commission

20 February 2010

30 December 2010

132 m of rope



TIPS #1: THE MARINE DEBRIS PROJECT

Teachers Involve Parents in Schoolwork

Dear Parent/Family Partner,

We are currently studying human impact on the environment, with a specific focus on plastics. In this assignment, I will talk with you a little bit about what I have been learning about these topics in ELA and Science, apply some math skills, and then we will examine our "human footprint" at home. I hope you enjoy this activity with me! The assignment is due _____.

Sincerely,

Student's signature

PART A: HOW LONG 'TIL IT'S GONE?

Family Partner: _____

Student: Ask your family partner to rank how quickly these items might deteriorate in the environment on a scale of 1-5 (1 breaks into small pieces the fastest, 5 breaks into small pieces the slowest)

| | | |
|--|---|--|
| Paper towel  | Plastic bag  | Plastic beverage bottles  |
| Disposable diapers  | Tin can  | Apple core  |

PART B: TRACKING OUR TRASH

Directions: This week, collect any trash you generate when cooking meals or preparing foods at home. We will use this trash to compare data and create graphs in class!

| Type of Trash | Amount (record with tally marks) |
|--|----------------------------------|
| Plastics (wrappers, utensils, disposable containers) | |
| Cardboard | |
| Paper products (napkins, paper towels, plates, etc.) | |
| Food scraps (peels, apple cores, seeds, etc.) | |

Solve with your family partner:

If 3,600 pieces of plastic trash wash up on Henderson Island in a day, how much will show up in the month of February? Show your work using an area model or partial products.

Explain 3 of the most shocking or interesting facts you have learned about Marine Debris. We discussed:

Dear Parent/Family Partner,

Please share your reactions to your child's work on this activity. Write YES or NO next to each statement.

_____ 1. My child understood the homework and was able to discuss it.

_____ 2. My child and I enjoyed the activity.

_____ 3. This assignment helped me know what my child is learning in class.

Other comments:

Parent Signature: _____

TIPS #2: THE MARINE DEBRIS PROJECT

Teachers Involve Parents in Schoolwork

Dear Parent/Family Partner,

We are currently using our creativity to explore the issue of marine debris. In this assignment, I will describe to you what I created and then ask you questions about my work. I hope that you enjoy this activity with me! The assignment is due _____.

Sincerely, _____ (Student's signature)

Part 1: Describe your work

Family Partner: _____

Student: I will be describing this creative work: _____

Describe (or show) your creative work to a family partner. Why did you create this work? What is the message of the work? What choices did you make in creating this work?

Part 2: Interview your family member

After describing your work, create two questions and interview your family partner to understand how your work made them feel.

Question 1: _____

Parent answer:

Question 2: _____

Parent answer:

Dear Parent/Family Partner,

Please share your reactions to this activity. Write YES or NO next to each statement.

_____ 1. My child understood the homework and was able to discuss it.

_____ 2. My child and I enjoyed the activity.

_____ 3. This assignment helped me know what my child is learning in class.

Other comments:

Parent Signature: _____

MARINE DEBRIS POETRY WORKSHEET

Haiku: a Japanese poem of seventeen syllables, in three lines, one line of five syllables, one line of seven syllables, and one line of five syllables; traditionally evoking images of the natural world.

Brainstorm

In the space below, describe parts of your waterway clean up today. What did you hear? What did you see? What did you feel? How did picking up debris make you feel? What types of images were you thinking about while collecting marine debris? Before you picked it up? While picking it up? After picking it up? How did collecting data make you feel?

Line one (5 syllables):

Line two (7 syllables):

Line three (5 syllables):

Peer feedback

After you read your haiku to your partner, what did they see? What did they hear in your poem? How did your poem make them feel?

CIRCLE OF VIEWPOINTS

Brainstorm: In the space below, list as many perspectives as you can think of that have come into contact with this piece of marine debris (human, animal, inanimate are all fine)

My viewpoint:

I think...

A question I have from my viewpoint...

JOURNEY OF X

Brainstorm: In the spaces below, jot down ideas for the lifespan of a piece of marine debris you collected. Where did it begin its "life"? How old is it? How did it get here? What did it see on its journey? What types of people or animals or things did it interact with during its lifetime (interaction can be positive and negative)? Does your object have feelings? If so, what would they be? Who is telling the object's story (first-hand or narrator)? Be creative!

Object: _____

Voice: _____

Age: _____

Adventures during beginning of life:

Adventures during middle of life:

Interactions during "lifetime":

Feelings:



How did it end up where it is now?



Other interesting details:



Sketch of the journey

PSA WORKSHEET

PSA STEP Two:

Analyze the PSA examples and then answer/discuss these questions on your own.
After finishing this sheet, discuss with your partner.

PSA Title to Analyze_____

What did the PSA want the audience to KNOW?

What did the PSA want the audience to FEEL?

What did the PSA want the audience to SEE?

What did the PSA want the audience to DO?

What strategy did the PSA use?

PSA STEP Three:

Make a PSA outline on Marine Debris:

In the space below, list all the marine debris facts that you can think of that are important to your PSA (hint: think about facts from your non-fiction articles/research):

Based on the marine debris facts, what do you want people to KNOW, FEEL, SEE and DO after the PSA?

I want people to KNOW:



I want people to FEEL:



I want people to SEE:



I want people to DO:



Of the PSAs you reviewed, which model best suits your ideas and why?

Using the information above, outline how you might make a marine debris PSA

| Activity Group | Activity title | Education Standards |
|---|---|--|
| MODULE 1.1: WASTE & PLASTICS | <ul style="list-style-type: none"> • Waste Audit • How Long Till It's Gone • What is Plastic? • A Plastic Ocean | <ul style="list-style-type: none"> • Social Studies: 4.G.1.2 Explain the impact that human activity has on the availability of natural resources in North Carolina. • Science: 4.P.2 Understand the composition and properties of matter before and after they undergo a change or interaction. • Science: 4.L.1.1 Give examples of changes in an organism's environment that are beneficial to it and some that are harmful. • Science: 4.L.1.3 Explain how humans can adapt their behavior to live in changing habitats (e.g., recycling wastes, establishing rain gardens, planting trees and shrubs to prevent flooding and erosion). • Science: 4.L.2 Understand food and the benefits of vitamins, minerals and exercise. |
| MODULE 1.2: STEM | <ul style="list-style-type: none"> • Physics of Marine Debris Movement • Majestic Plastic Bag • Marine Debris Entanglement | <ul style="list-style-type: none"> • Social Studies: 4.G.1.2 Explain the impact that human activity has on the availability of natural resources in North Carolina. • Math: 4.OA.2 Multiply or divide to solve word problems involving multiplicative comparison. • Math: 4.OA.3 Solve multi-step word problems posed with whole numbers and having whole-number answers using the four operations, including problems in which remainders must be interpreted. Represent these problems using equations with a letter standing for the unknown quantity. Assess the reasonableness of answers using mental computation and estimation strategies including rounding. • Math: 4.NBT.4 Fluently add and subtract multi-digit whole numbers using the standard algorithm. • Math: 4.NBT.5 Multiply a whole number of up to four digits by a one-digit whole number, and multiply two two-digit numbers. |

| | | |
|---|--|--|
| | <ul style="list-style-type: none"> • <i>Cont.</i> | <ul style="list-style-type: none"> • Math: 4.NF.4 Apply and extend previous understandings of multiplication to multiply a fraction by a whole number. Solve word problems involving multiplication of a fraction by a whole number. • Math: 4.NF.6 Use decimal notation for fractions with denominators 10 or 100. • Math: 4.MD.1 Know relative sizes of measurement units within one system of units. • Math: 4.MD.2 Use the four operations to solve word problems involving distances, intervals of time, liquid volumes, masses of objects, and money, including problems involving simple fractions or decimals, and problems that require expressing measurements given in a larger unit in terms of a smaller unit. Represent measurement quantities using diagrams such as number line diagrams that feature a measurement scale. • Math: 4.MD.3 Apply the area and perimeter formulas for rectangles in real world and mathematical problems. • Technology: 4.TT.1 Use technology tools and skills to reinforce classroom concepts and activities. • Technology: 4.RP.1 Apply a research process as part of collaborative research. |
| MODULE 2.1: FIELD RESEARCH | <ul style="list-style-type: none"> • Collect & Quantify Marine Debris | <ul style="list-style-type: none"> • Science: 4.L.1.1 Give examples of changes in an organism's environment that are beneficial to it and some that are harmful. • Science: 4.L.1.3 Explain how humans can adapt their behavior to live in changing habitats (e.g., recycling wastes, establishing rain gardens, planting trees and shrubs to prevent flooding and erosion). |

MODULE 2.1: FIELD RESEARCH

- Data Analysis & Quantification

- Social Studies: 4.G.1.2 Explain the impact that human activity has on the availability of natural resources in North Carolina.
- Math: 4.OA.2 Multiply or divide to solve word problems involving multiplicative comparison.
- Math: 4.OA.3 Solve multi-step word problems posed with whole numbers and having whole-number answers using the four operations, including problems in which remainders must be interpreted. Represent these problems using equations with a letter standing for the unknown quantity. Assess the reasonableness of answers using mental computation and estimation strategies including rounding.
- Math: 4.NBT.4 Fluently add and subtract multi-digit whole numbers using the standard algorithm.
- Math: 4.NBT.5 Multiply a whole number of up to four digits by a one-digit whole number, and multiply two two-digit numbers.
- Math: 4.NF.4 Apply and extend previous understandings of multiplication to multiply a fraction by a whole number. Solve word problems involving multiplication of a fraction by a whole number.
- Math: 4.NF.6 Use decimal notation for fractions with denominators 10 or 100.
- Math: 4.MD.1 Know relative sizes of measurement units within one system of units
- Math: 4.MD.2 Use the four operations to solve word problems involving distances, intervals of time, liquid volumes, masses of objects, and money, including problems involving simple fractions or decimals, and problems that require expressing measurements given in a larger unit in terms of a smaller unit. Represent measurement quantities using diagrams such as number line diagrams that feature a measurement scale.

| | | |
|---|---|---|
| MODULE 2.1: FIELD RESEARCH | <ul style="list-style-type: none"> • Data Analysis & Quantification (<i>cont.</i>) | <ul style="list-style-type: none"> • Math: 4.MD.3 Apply the area and perimeter formulas for rectangles in real world and mathematical problems. • Technology: 4.TT.1 Use technology tools and skills to reinforce classroom concepts and activities. • Technology: 4.RP.1 Apply a research process as part of collaborative research. |
| MODULE 3.1: COMMUNITY ART | <ul style="list-style-type: none"> • Marine Debris Art | <ul style="list-style-type: none"> • Art: 4.V.1.2: Apply personal choices while creating art. • Art: 4.V.1.3: Infer meaning from art. • Art: 4.V.1.4: Understand how the Elements of Art are used to develop a composition. • Art: 4.V.1.5: Understand how the Principles of Design work in relation to each other. • Art: 4.V.2.1: Identify different successful solutions to artistic problems. • Art: 4.V.2.2: Use ideas and imagery from North Carolina as sources for creating art. • Art: 4.V.2.3: Create abstract art that expresses ideas. • Art: 4.V.3.1: Apply a variety of methods of manipulating a single tool, safely and appropriately • Art: 4.V.3.2: Compare characteristics of a variety of media. • Art: 4.V.3.3: Create art using the processes of drawing, painting, weaving, printing, stitchery, collage, mixed media, sculpture, ceramics, and current technology. • 4.CX.2.2: Apply skills and concepts learned in other disciplines, such as math, science, language arts, social studies, and other arts, in the visual arts. |

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| MODULE 3.1: COMMUNITY ART | <ul style="list-style-type: none"> • Marine Debris Poetry • Circle of Viewpoints • Journey of X Mural • PSAs | <ul style="list-style-type: none"> • ELA: 4.R. 7 Integrate and evaluate content presented in diverse media and formats, including visually and quantitatively, as well as in words. • ELA: 4.R. 8 Delineate and evaluate the argument and specific claims in a text, including the validity of the reasoning as well as the relevance and sufficiency of the evidence. • ELA: 4.R.10 Read and comprehend complex literary and informational texts independently and proficiently. • ELA: 4.W 1-10 (hits all the writing and editing standards) • Social Studies: 4.G.1.2 Explain the impact that human activity has on the availability of natural resources in North Carolina. • Social Studies 4.G.1.3 Exemplify the interactions of various peoples, places and cultures in terms of adaptation and modification of the environment. • Technology: 4.TT.1 Use technology tools and skills to reinforce classroom concepts and activities |
| MODULE 3.2: CIVIC ENGAGEMENT & COMMUNICATION | <ul style="list-style-type: none"> • Public Presentation of Art & Civic Engagement | <ul style="list-style-type: none"> • Civics & Government: 4.C&G.1.2 Compare the roles and responsibilities of state elected leaders. • Technology: 4.TT.1 Use technology tools and skills to reinforce classroom concepts and activities. • Technology: 4.RP.1 Apply a research process as part of collaborative research. • ELA: 4.SL.1-6 Covers all the speaking and listening standards. |
| MODULE 5.1: DOCUMENTATION | <ul style="list-style-type: none"> • Documentary Video | <ul style="list-style-type: none"> • Technology: 4.TT.1 Use technology tools and skills to reinforce classroom concepts and activities. • ELA: 4.SL.1-6 Covers all the speaking and listening standards.. |

